DOCUMENT RESUME

ED 107 165 HE 006 450

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TITLE	Growth and Education: A Strategic Report to the Rockefeller Brothers Fund on the Implications of Growth Policy for Postsecondary Education
INSTITUTION	Western Interstate Commission for Higher Education, Boulder, Colo.
PUB DATE	Dec 74
NOTE	122p.
EDRS PRICE	MF-$0.76 HC-$5.70 PLUS POSTAGE
DESCRIPTORS	*Curriculum Development; *Educational Development; Educational Finance; Educational Needs; Educational Resources; Evaluation; *Growth Patterns; *Higher Education; *Post Secondary Education

ABSTRACT

This document attempts to identify for the Rockefeller Brothers Fund how it may best invest its resources in postsecondary education to facilitate transformation to an equilibrium state. As the work of the project developed, it was found that the issue of "limits to growth and higher education" had two facets: (1) what role can the postsecondary education system play in developing or implementing models of alternative futures and solutions to the present crisis; and (2) how can postsecondary education solve or even approach its own "limits to growth" of rising costs and dropping enrollments and revenues? In order to recommend funding strategies, six key ingredients of "leverage" on the postsecondary education system were identified. These are: (1) interest; (2) understanding of the nature of the problem confronted; (3) identification of development of curricula appropriate to the problem and to educational goals; (4) models of educational settings that reflect curricular goals and methods; (5) expertise in organizational development to facilitate necessary change and innovations; and (6) incentive systems that reward appropriate curiculum development and institutional change. The document also recommends goals; defines an adequate ecological education; defines resources and needs; and recommends seven possible projects. Appendixes A to I follow. (Author/KE)

GROWTH AND EDUCATION

A Strategic Report to the Rockefeller Brothers Fund on the Implications of Growth Policy for Postsecondary Education

U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
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EDUCATION

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WESTERN INTERSTATE COMMISSION FOR HIGHER EDUCATION

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GROWTH AND EDUCATION

A Strategic Report to the Rockefeller Brothers Fund on the Implications of Growth Policy for Postsecondary Education

December 1974

Project to Study the Implications
of Growth Policy for Postsecondary Education

Lewis J. Perelman, Director

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"An Equal Opportunity Employer"

Human history becomes more and more a race
between education and catastrophe.
- H. G. Wells

PREFACE

This is the final report of the Project to Study the Implications of Growth Policy for Postsecondary Education. The project was conducted at the Western Interstate Commission for Higher Education, and was supported by a grant from the Rockefeller Brothers Fund.

A synopsis of the report's analysis and conclusions is contained in the Summary on pp. 59-65. People whom we interviewed are occasionally quoted. These individuals, and others we interviewed are identified in a list in Appendix D (pp. 81-85).

In addition to this report, three of the supplementary documents produced by this project are also available. The Resource Directory on Growth and Education (127 pages) contains information about the interests and activities of about 90 individuals and institutions concerned with growth and education. The Working Paper (149 pages), entitled "The Implications of Growth Policy for Postsecondary Education: A Model and Proposed Course of Action," contains an initial discussion by Perelman and Bergquist of some of the central issues and problems of this project. The Bibliography on Growth and Education (39 pages) provides a categorized list of books, articles, and papers that were used in this project. All of these documents, along with this report, have been filed with the Educational Resources Information Center (ERIC) and may be obtained through that service.

A limited number of additional copies of this report are available from the Western Interstate Commission for Higher Education at $3.00 per copy (postage and handling extra for orders outside the U.S. and Canada). Copies of the supplementary documents mentioned above may be obtained from WICHE at cost.

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I. THE PROBLEM

In the proposal for this project, we defined the problem the project would attempt to address in general terms.[1] In this section, we will redefine the problem this report addresses in more specific, pragmatic terms.

I.A. Assumptions

The analysis and recommendations contained in this report are grounded in several basic assumptions or beliefs. We believe that these are largely shared by those of us who have been directly involved in the project, and also by most of those who belong to the larger community of interest that we labelled "the beyond limits school" in our proposal.[2]

Assumption #1: Our world today is in a state of unprecedented danger. This planetary danger is commonly discussed in terms of several key dimensions, including: the degradation of the environment; the explosive growth of human population; the rapid depletion of critical resources; the deleterious effects of technology; the gap between the "haves" and "have-nots"; and the growing threats of war and violence. Together, these dimensions define a state of ecological crisis--"ecological" in the sense that the crisis involves all the complex interrelationships among individual, society, and environment. Shane calls this the "crisis of crises."[3] The vision of the most probable future in-

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[1] See Appendix B.

[2] See Appendix B.

[3] From a speech by Harold Shane at the Science Museum of Minnesota's Futures Curriculum Workshop, 24 July 1974. According to Shane, the components of the "crisis of crises" are: (a) a value crisis; (b) a conceptual crisis (what is the "good life"?); (c) the equity crisis (what is fair?); (d) the power question (political interest groups, minorities, factions, etc.); (e) the credibility problem; (f) the institutional crisis (conventional institutions failing to serve their purposes); (g) de-

(continued)

cludes one, and probably several, localized disasters, as well as the distinct possibility of an ecological catastrophe of global proportions.[4]

Assumption #2: The common response of our conventional institutions and leadership to the various aspects of this crisis has been what Michael (after Lindblom) calls "disjointed incrementalism."[5] The key characteristics of this

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3. (continued)
finition of "democracy"; (h) lack of a future-focused role image for most individuals; (i) survival behavior (human behavior that used to have survival value now threatens survival); and (j) the have-and-have-not dilemma.

4. Most of the people we talked to were pessimistic in their images of the most probable future. John Platt says that he believes that the U.S. has perhaps a 15-20% chance of surviving until the year 2000; Platt claims that this makes him an optimist. Indeed, most of those we talked to anticipated major catastrophes of one sort or another within the near future. A majority of both expert and public opinion now anticipates a 1930's style Depression in the U.S. and the rest of the West in the immediate future. There is widespread expectation of renewed war in the Middle East, and of massive famine throughout much of the Third World. Other recent prognostications include: extensive earthquakes, tidal waves, violent crime, nuclear blackmail, deterioration of the ozonosphere as a result of aerosol spray propellants or SST's, a new "ice age" within 20 years, etc. John Platt's projections are: nuclear war, megafamines (10-50 million), oil-energy management, economic collapse, struggle for dwindling resources, ocean management, collapse of development hopes, land-reform-commune revolutions, 1984 type dictatorships, religion-reform confrontations, controls on multinational corporations. (Synergy Access, #4, p.1. For more on projections of global catastrophe, see SynergyAccess, #6, pp. 4-5).

5. See: Donald Michael. On Learning to Plan--and Planning to Learn: The Social Psychology of Changing Toward Future-Responsive Societal Learning. San Francisco: Jossey-Bass, 1973. p.4.

Chen, Lagler, et al list the following characteristics of "disjointed incrementalism":

"1. Attempt at understanding is limited to policies that differ only incrementally from approach are (a) a kind of "tunnel vision" in the analysis of problems and in the design of solutions, (b) a lack of coordination or integration of efforts, and (c) a strong penchant for the "technological fix."

Assumption #3: However, the response required to deal with the crisis successfully is of a much more systematic, fundamental, and personal nature. The changes required to solve the problems are what Watzlawick et al call "second order" changes.[6] They imply innovations that are more

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5. (continued)
existing policy.
2. Instead of simply adjusting means to ends, ends are chosen that are appropriate to available or nearly available means.
3. A relatively small number of means (alternative possible policies) is considered, as follows from 1.
4. Instead of comparing alternative means or policies in the light of postulated ends or objectives, alternative ends or objectives are also compared in the light of postulated means or policies and their consequences.
5. Ends and means are chosen simultaneously; the choice of means does not follow the choice of ends.
6. Ends are indefinitely explored, reconsidered, discovered, rather than relatively fixed.
7. At any given analytical point ("Point" refers to any one individual, group, agency, or institution), analysis and policy making are serial or successive; that is, problems are not "solved" but are repeatedly attacked.
8. Analysis and policy making are remedial; they move away from ills rather than toward known objectives.
9. At any one analytical point, the analysis of consequences is quite incomplete.
10. Analysis and policy making are socially fragmented; they go on at a very large number of separate points simultaneously."

(Kan Chen, Karl F. Lagler, et al. Growth Policy: Population, Environment, and Beyond. Ann Arbor, MI: U. of Michigan Press, 1974. pp. 168-69.)

[6] See: Paul Watzlawick, John H. Weakland and Richard Fisch. Change: Principles of Problem Formation and Problem Resolution. New York: Norton, 1974. pp. 10-11:

> "....(T)here are two different types of change: one that occurs within a given system which itself remains unchanged, and one whose occurrence changes the system itself. To exemplify this distinction in more behavioral terms; a person having a nightmare can do many things in his dream--

"central" than "peripheral" to the structure of society.[7] And they must occur not merely on the technical or instrumental level, but also on the higher levels of personal values and reality images.[8]

Assumption #4: It follows from #3 that the peaceful resolution of the ecological crisis will require a substantial transformation[9] of the current "dominant social paradigm"[10] and of our conventional "images of man."[11]

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6. (continued)
run, hide, fight, jump off a cliff, etc.--but no change from any one of these behaviors to another would ever terminate the nightmare. *We shall henceforth refer to this kind of change as first-order change*. The one way *out* of a dream involves a change from dreaming to waking. Waking, obviously, is no longer a part of the dream, but a change to an altogether different state. *This kind of change will from now on be referred to as second-order change*....Second-order change is thus *change of change*--the very phenomenon whose existence Aristotle denied so categorically."

[7] See: Donald Schon. *Beyond the Stable State*. New York: Norton, 1971. Ch. 4.

[8] See: Chen, Lagler, et al. Op. cit. p. 26.

[9] The term "transformation" should not be confused as synonymous with political revolution. See our *Working Paper*, Chapter 2.

[10] See: Dennis Pirages and Paul Ehrlich. *Ark II: Social Response to Environmental Imperatives*. San Francisco: Freeman, 1974. -- For some relevant excerpts, see Appendix E of this report.

[11] See: Michael, Op. cit.
Also see: O. W. Markley et. al. *Changing Images of Man*. Policy Research Report 4. Menlo Park, CA: Stanford Research Institute, May 1974.

The direction of this transformation will be from our current "unstable state"[12] to a state of "equilibrium."[13]

Assumption #5: The "state of equilibrium" is not a single, optimal model of society, but rather is simply a label referring to a large--perhaps infinite--set of alternative futures which share the characteristic of being stable, or sustainable.[14]

Assumption #6: Finally, education is viewed as an important--if not essential--part of the process of transformation from our current unstable state of ecological crisis to a state of equilibrium.

I.B. Definition of the Problem

The specific, practical problem which this report is intended to address is suggested by the following remarks from Gerald Barney's Memorandum of 16 September 1974:

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[12] See: Schon. Op. cit. Ch. 1.

[13] See: Donella H. Meadows, et al. The Limits To Growth. New York: Universe Books, 1972. Chapter 5.
Also see: Herman E. Daly, ed. Toward a Steady-State Economy. San Francisco: Freeman, 1973.

[14] In addition to the references cited in footnote #13, see: Edward Goldsmith, et al. "A Blueprint for Survival". The Ecologist, II, 1. January 1972.
Pirages and Ehrlich. Op. cit.
Gordon Rattray Taylor. Rethink: A Paraprimitive Solution. New York: Dutton, 1973.
Ivan Illich. Tools for Conviviality. New York: Harper & Row, 1973.
Ervin Laszlo. A Strategy for the Future. New York: George Braziller, 1974.
W. Warren Wagar. Building the City of Man. San Francisco: Freeman, 1971.
Geoffrey Vickers. Freedom in a Rocking Boat. Baltimore: Penguin, 1972.
R. Buckminster Fuller. Operating Manual for Spaceship Earth. New York: Pocket Books, 1970.
Dennis Gabor. The Mature Society. New York: Praeger, 1972.

(continued)

> ...With its limited resources the Fund must identify the most likely sources for meaningful change within the educational system and make every effort to use these "centers of interest" or "soft spots" as "leverage" points for our limited funds. ...The WICHE study is an effort to find "soft spots" within the system of higher education--places with both the interest and the institutional readiness; the results will guide staff into more effective grantmaking in the future. Accordingly, what is required of the study is information about where significant change might occur... as well as where some widespread interest occurs for future development and acceptance of change in the system. Since interest in this area is very limited among foundations in general, and curriculum development tends to be very money intensive, it is especially important for the Fund to select very carefully the areas of education it will support.[15]

Based on this memo, our two meetings with RBF staff, and a number of conversations with Gerald Barney and John Esty over the past several months, we define the problem to which this report is responding as: to indicate how the Rockefeller Brothers Fund--with limited[16] and possibly diminishing funds--can invest its resources to promote, as efficiently as possible, significant change and innovation in the postsecondary

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14. (continued)

Victor Ferkiss. The Future of Technological Civilization. New York: George Braziller, 1974.

Glenn T. Seaborg, et al. "The World of 1994". The Futurist, VIII, 3. June 1974.

Norman Cousins, et al. "2024 A.D." Saturday Review/World, 24 August 1974.

[15] See Appendix C.

[16] Approximately $200,000 per year.

educational system[17] that will contribute to transformation from a state of ecological crisis to a state of equilibrium. The emphasis here is on the practical question of how the Fund can achieve maximum constructive impact with the resources at its command.

I.C. Two Sides of the Limits to Growth and Higher Education Question

In our work on this project, we have commonly used the term "The Limits to Growth and Higher Education" (LTG/HE) as a shorthand label for the project's subject. An important and relevant point that was not made in our proposal for this project is that there are two sides to the question, "What does 'limits to growth' imply for higher education?"

First, at least since 1970 and the first Earth Day, there has been growing interest on college and university campuses in the problems of growth and equilibrium. In this period, a number of courses and programs have developed focusing on such problem areas as environment, population, resources, urbanization, technology, etc. as well as in broader interdisciplinary areas such as futuristics and systems science. The publication in 1972 of the Club of Rome's The Limits to Growth[18] (based on Forrester's earlier World Dynamics)[19] further stimulated activity in this area. As a result of the Energy Crisis, the Food Crisis, the Inflation Crisis, and the general "crisis of crises" now afflicting our society, there is widespread and serious interest in directing the resources of our higher education system toward the study and, hopefully, the solution of the myriad problems related to the "limits to growth."

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[17] Postsecondary Education: This includes not only formal undergraduate, graduate and professional degree programs, but also fellowships, internships, in-service training, institutes, workshops, adult and extension education, and educational programs carried on through various non-school organizations, mass media, etc. Postsecondary education can be divided into two main sectors: the collegiate and the non-collegiate. The collegiate sector includes all two- and four-year, private and public colleges and universities. The non-collegiate sector consists of all other institutions that offer educational programs beyond the secondary school level; including libraries, museums, recreational programs, proprietary schools, vocational and professional in-house training programs,etc.

[18] Meadows, et al. Op. cit.

[19] Jay W. Forrester. World Dynamics. Cambridge, MA: Wright-Allen Press, 1971.

The other side of this subject is the rapidly growing interest within the higher education community in the "limits to growth" of the higher education system itself. With the passing of the "baby boom" generation into adulthood, enrollments in colleges and universities in the next several years are expected to level off and decline. For private institutions, a depressed economy has reduced income from endowments, discouraged contributions, and dried up the flow of foundation grants, reducing income while inflation has made costs skyrocket. Public institutions are only slightly better off, as tax-payers and legislators have become increasingly budget-conscious while inflation continues to take its toll. The short-term response to these conditions has included cost-cutting, retrenchment, and more active--sometimes cutthroat--competition among institutions to attract increasingly scarce dollars and students. These conditions represent not a temporary disturbance, but a long-term trend which will dictate major changes in the character of higher education in the U.S.[20]

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[20] See the following:
"Higher Education: Pricing Itself out of the Market?" Forbes, 15 Sept. 74.
James Carberry. "Double Trouble: Endowment Funds During Slump Give Colleges Twin Woes." The Wall Street Journal, 29 Nov. 74.
Elmer Jagow. "Management Talents Required for the Steady State." (Position paper for the Annual Meeting of the American Council on Education, 10 Oct. 74.) Washington, D.C.: American Council on Education, 1974 (to be published in 1975).
Albert H. Bowker. "Managing the Faculty Resource in the Steady State." (Position paper for the Annual Meeting of the American Council on Education, 10 Oct. 74.) Washington D.C.: American Council on Education, 1974 (to be published in 1975).

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A basic premise of this report will be that these two sides of the LTG/HE question are, in fact, opposite sides of the same coin and must be considered together. If the higher education system is to respond effectively to its own "limits to growth," it must see and understand its problem in the context of the "limits to growth" of the larger world. Conversely, if educators are to undertake successfully the research and teaching required to help solve the many problems of growth and equilibrium in the world as a whole, they must do so with an appreciation of the limitations and future prospects of the educational system itself.

Specifically, the two-sidedness of the LTG/HE question has important practical implications for this report. First, the widespread recognition that the higher education system is in a situation where change is inevitable makes the problem of "leverage" simpler. That is, the problem becomes less one of *creating* change and more one of *directing* it. Second, the high degree of concern among the leaders of the higher education system for the second side of LTG/HE question offers a powerful entry point for consideration of the first side of the question. Educators who have been grappling intensely with the thorny problems of "limits to growth" in their own backyard have become sensitive to the problems of growth and equilibrium in the world as a whole. Also, to the extent that it can be demonstrated that the answer to the first

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20. (continued)
Larry L. Leslie and Howard F. Miller, Jr. "Higher Education and the Steady State." (Paper prepared for the ERIC Clearinghouse on Higher Education.) Center for the Study of Higher Education, The Pennsylvania State University, 1 March 1974.
Juanita M. Kreps. "Higher Education in a Low-Growth, High-Inflation Economy." (Position paper for the Annual Meeting of the American Council on Education, 10 Oct. 74.) Washington, D.C.: American Council on Education, 1974 (to be published in 1975).
Patrick H. Sullivan. "How Does Your Garden Grow?" Santa Cruz, CA: Patrick H. Sullivan, University of California at Santa Cruz, 1974.
Jay W. Forrester. "Growth, Equilibrium, and Self-Renewal." *Creative Renewal in a Time of Crisis: Report of the Com-*

(continued)

question is essential to, or at least consistent with, the answer to the second question, the probability is increased that meaningful change and innovation can be introduced into the higher education system that will contribute to the transformation to equilibrium in the larger world.

I.D. The Ingredients of Leverage

The essential problem in this report is to suggest how RBF can achieve "leverage" on the postsecondary education system. We believe that doing this requires an explicit idea of what the ingredients of "leverage" are. In our conversations, and in the Barney memo[21], Dietel and Barney have implied that the essential ingredients of "leverage" are (1) *interest*, and (2) *institutional 'readiness'*.

On the other hand, Don Michael argued in his conversation with Perelman that because the postsecondary education system is in such an unstable and changing state, we really do not know where the "leverage points" in the system are. Under these circumstances, Michael suggested that we *create* "leverage points" by *defining* and *using* them. In other words, we should make constructive use of the "self-fulfilling prophecy."

Our own study and experience in higher education suggest that we have relatively little useful historical knowledge about the nature of innovation and change in higher education.[22]

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20. (continued)
mission on MIT Education. Cambridge, MA: Massachusetts Institute of Technology, November 1970
Dennis Meadows and Lewis Perelman. "Limits to Growth: A Challenge to Higher Education." *Impact*, III, 2. June 1974.

[21] See Appendix C.

[22] For discussion of the almost total lack of evaluation research in higher education, see:
Elisabeth K. Allison. "The Evaluation of Educational Experience." *American Higher Education: Toward an Uncertain Future*. Volume I. *Daedalus*, CIII, 4. Fall 1974
Paul F. Gross. "A Critical Review of Some Basic Considerations in Postsecondary Education Evaluation." *Policy Sciences*, IV, 2. June 1973.

Furthermore, we conclude Michael is right: the system is changing too substantially and too rapidly for historical precedent to be of much use anyway.

Therefore, following Michaels' suggestion, we are offering a list of six key ingredients for "leverage." We make no claim that the model implicit in this list is valid; only that it may be useful for the purposes of this report. Essentially we have expanded the notion of "institutional 'readiness'" already suggested by Dietel and Barney. The six essential ingredients for "leverage" are:

(1) Interest.

(2) Understanding of the nature of the problem.[23]

(3) Instructional materials/techniques--i.e., curriculum--appropriate to the educational goal.[24]

(4) Models of educational settings that are consistent with and conducive to the curriculum.

(5) Organizational Development (OD) resources--'know-how' and competent consultants--appropriate for facilitating the changes and innovations implied by (4).

(6) Incentives for (3) and (4) to be implemented. These include student, faculty and administrator incentives[25] and generally, the existence of an effective demand for the products (research and manpower) of an innovative postsecondary education system.[26]

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[23] That is, in terms at least similar to those of the assumptions in section I.A.

[24] Educational goals are discussed in section II.

[25] See section IV.B.

[26] The emphasis must be on effective demand. Lip-service is commonly paid to the need for innovation in higher education, but a commitment is needed to actually employ the products of innovative educational programs.

We will return to these six items in section IV to use them in assessing the prospects for "leverage" in the current postsecondary education system.

II. GOALS

As the Rockefeller Brothers Fund carries its interest in the problems of growth and equilibrium forward into the area of education, the RBF staff will develop and define specific educational goals it hopes to achieve through its grant-making activities. This report cannot provide any short-cuts around this difficult process. However, it can facilitate the process by providing some ideas for further consideration and discussion. In this section, we recommend some general goals that the Fund may want to consider for its future grant-making activities, and raise some questions that the RBF staff should consider as it proceeds through the goal-developing process.

II.A. Ecological Education

In the remainder of this report, it will be convenient to use a single term as a proxy for the various educational goals that are recommended here and/or that may eventually be chosen by RBF. In earlier writings, Perelman has used the term "ecological education" as a general label for educational processes designed to contribute to the transformation from ecological crisis to a state of equilibrium.[27] Consistent with the definition of "the problem" in section I.B, we have already assumed the Fund's most general goal to be the promotion of "ecological education." In this section we suggest what this should mean in more specific terms.

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[27] See: Meadows and Perelman. Op. cit. p. 26:
"The total requirement is for educational processes as part of a social servo-mechanism that can gain control of a world run amok and that can lead it toward and maintain it in a state of sustainable equilibrium. ...What such a mechanism should be called...is somewhat immaterial as long as the essential function is recognized. We prefer the term "Ecological Education." ... "Ecological Education, then, must be an effective mechanism for producing individual and social changes on a global basis to steer human society away from its current collision course with ecological catastrophe. It must be clearly understood, moreover, that when we speak of Ecological Education we are not merely discussing some esoteric subset of the general educational system--like Adult Education, or Sex Education--rather, we are speaking of a new vision of the meaning of 'education' in terms of both goals and processes."

II.B. Educational Goals

(1) Not merely to "further the 'Limits' debate, but to go "beyond limits." In his memo,[28] and in several of our conversations, Barney has used the term, "further the growth debate," in referring to the Fund's educational objectives. We find this term ambiguous.

If "further the growth debate" means to promote more debate about Limits to Growth, we feel that it is too timid and unfruitful a goal for the Fund to pursue with its admittedly scarce resources. Rather we recommend that the Fund bend its efforts toward the cultivation of what we called in our proposal the "beyond limits" school.[29] This is a community of interest less concerned with the question of whether there are "limits to growth" than with the problem of designing and achieving possible "equilibrium" futures.[30] If "further the growth debate" means to elevate the discourse from the "whether limits" level (Is the world round?--Galileo and the Pope) to the "beyond limits" level (How shall we navigate?--Columbus and Magellan), it is consistent with the goals recommended in this report.

(2) To educate people to be competent in finding solutions to the problems of growth and equilibrium[31] rather than to sell

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[28] See Appendix C.

[29] See Appendix B.

[30] At the time we wrote wrote our proposal, the idea that such a community, or school, or network existed was both novel and speculative. The experience of this project has demonstrated that such a community of interest does, in fact, exist.

[31] See our Working Paper, pp. 70-71.

a particular position on "limits to growth." This point cannot be emphasized strongly enough. It is possible--and often necessary--to attack the critical and exceedingly complex problems of growth and equilibrium at the "beyond limits" level without being compelled first to genuflect at the altar of Rome (the Club of). An excellent example of such an approach is provided in the work of Chen and Lagler et al on Growth Policy.[32]

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[32] See: Chen, Lagler, et al. Op. cit. pp. 4-5:

> "An increasing number of persons, including scientists, suggest we are approaching the ultimate limits of resource use and environmental manipulation faster than most people realize. Given the very long time constants in the macroproblem--the time it requires for a population to stabilize, for certain irreversible environmental impacts to be widely recognized, and for our social and political institutions to make fundamental policy changes--civilization may soon be unable to avert the dire consequences of the world macroproblem. But if we begin now, there still may be time to devise solutions.
>
> "In this study we do not wish to debate the issue of whether or not the macroproblem exists. That issue is and will continue to be debated in many arenas. We think it just as appropriate to make the assumption that the macroproblem could exist. All of us should agree that the one thing known on this issue is that no one at present knows for certain what the future holds. Rather than debate the macroproblem, we assume its existence so that we can go on to explore methods of coping with it. Certainly the long time constants and the complexity of the macroproblem justify making that assumption now. By the time the existence of the macroproblem would be accepted and the form of the macroproblem would be understood by all, it would be too late to formulate and then implement policies that could deal with it." (Emphasis added.)

This statement is one of the best symbolic representations we know of for the existence of a "beyond limits" school of thought.

(3) To create a new model of the "educated person." Historical concepts of the "educated person"--the "philosopher king," the "Renaissance man," etc.--are no longer applicable to the contemporary human and planetary condition. While no single unifying hypothesis of human nature has yet emerged to replace these earlier concepts,[33] a recent Stanford Research Institute study of "Changing Images of Man" found evidence that a new dominant image of man is coming.[34] More important, the SRI report argued that "(t)he increasingly serious dilemmas of industrialized society appear to require for their ultimate resolution a drastically changed image of man-on-earth."[35] Willis Harman reinforced this view in his conversation with Perelman, saying that "the one crucial job to be done"--in regard to the central problem of this project--is to "cure our wrong-headedness about our images of man."

In addition to the need for new images of man, there is a need for new concepts and standards of competence. Jay Forrester has perennially remarked on the "counterintuitive"[36] behavior of complex social/ecological systems, observing that conventional responses to problems in such systems tend to be either impotent or counterproductive.[37] The general loss of public confidence in our political, economic, and social institutions and leadership has been widely documented and discussed. Our gods have developed a critical (and probably terminal) case of "clay feet."[38] Under these circumstances, Don Michael told Perelman, we "have to rethink, in the face of violent opposition, the role of elites in regard to competence."

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[33] Aspen Institute for Humanistic Studies. Prospectus for a conference on "The Educated Person in the Contemporary World." For a report on this conference, see: The New York Times, 10 August 1974.

[34] O.W. Markley, et al. Changing Images of Man. Policy Research Report 4. Menlo Park, CA: Stanford Research Institute, May 1974.

[35] Ibid. Summary. Emphasis added.

[36] That is, from the perspective of the "conventional wisdom."

Generally, Michael said that he could see no way to achieve the kind of "long range social planning" (lrsp) required to create a sustainable future without a basic change of our image of human beings to one of "learners." In our Working Paper, we coined the term "transformer" as a general label for the new "learner" or "educated person"--one who would be competent to lead the transformation of dynamically conservative social systems from a state of crisis to one of equilibrium.[39] In the remainder of this report, we continue to use the term "transformer" in this sense.

In short, we see a critical need for a new model of the "educated person"--based on new images of man and new standards of competence--to provide direction for our educational efforts. While there is already considerable agreement about some of the major ingredients of the new model, RBF should make one of its general goals the further development and clarification of such a model.

(4) To develop educational processes to produce "transformers." We need, ultimately, to develop an "ecological education" that can produce the "transformers" defined by the emerging new model. Furthermore, we cannot wait for a perfect model of the "transformer" to be created before developing the instructional techniques and technology required to educate such people. No such final image is likely ever to

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37. Jay W. Forrester. "Counterintuitive Behavior of Social Systems." (Testimony for the Subcommittee on Urban Growth of the Committee on Banking and Currency, U.S. House of Representatives, 7 October 1970.) Cambridge, MA: Jay W. Forrester, Massachusetts Institute of Technology, 1970.

38. A recent article in Business Week noted that the conventional political-economic establishment had failed to understand--much less cope effectively with--the critical economic problems of the past year or so, and remarked that this general failure "...suggests that the entire body of economic thinking...is inadequate to describe and analyze the problems of our times." ("Theory Deserts the Forecasters." Business Week, 29 June 74.p. 50.)

39. See our Working Paper, p. 35+.

be achieved, since the concept of "educated" will continuously evolve as the conditions of society change, as our understanding and knowledge of human potential expand, and as our standards of competency become more sophisticated. Even while our conception of the "transformer" is being developed, there will be a critical need for at least a "more-educated" leadership and public. Even though we do not know exactly what a "transformer" is or what such a person needs to know, we think we do have enough of an idea[40] to start to put together the pieces of an adequate ecological education.[41] The development of the processes of an ecological education should be a major goal of RBF's activities in the educational field.

II.C. Research Goals

Research is such an integral part of our higher education system that we must recommend some goals for the research carried on in our educational institutions. On the other hand, research, per se, was not the major concern of this project, and therefore our recommendations for research goals will be brief and rather general. We recommend three goals for research that RBF may wish to support or promote in response to the problem that this project has addressed; these goals are:

(1) To learn all we can about the causes and consequences of growth, growth alternatives, equilibrium systems, etc.[42]

(2) To learn all we can about social and institutional transformation. Can small-group change be extrapolated successfully to large systems? What new and effective strate-

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[40] See our Working Paper, Chapter 2.

[41] See section III.

[42] RBF's current support of the Forrester project is along this line, as was the Fund's sponsorship of the task force on land use.

gies can we develop for what kind of institutional transformation?

(3) To learn all we can about consciousness, human potential, "changing images of man," etc. We need to explore and extend parapsychology, meditational techniques, biofeedback, interpersonal processes, etc. toward greater understanding of individual capacity for transformation and 'altered states of being' as these relate to transformation in the larger world.

II.D. Adults or Children?

An important question which RBF will consider in formulating its educational goals is whether priority should be given to adults or children as the target of its educational efforts. Should the focus be primarily at the level of postsecondary education or at the level of elementary and secondary education? In supporting this project, the Fund made the working assumption that its interest in educational change and innovation should focus on the postsecondary education level.[43] We assume, however, that the question remains an open one for the RBF staff.

A comprehensive discussion of the question is beyond the responsibilities of this project and the scope of this report. However, the experience and knowledge gained in this project have served to reinforce our original feeling that RBF should focus its activities at the postsecondary level of education. We recommend that the Fund make its working assumption on this question a matter of continuing policy.

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43. The rationale for this project's focus on the postsecondary level is presented in part in Appendix F.

II.E. Top-down or Bottom-up?

In our research and conversations associated with this project we have had to consider whether a "top-down" or a "bottom-up" strategy is best for achieving change. An educational approach using the top-down strategy tries to reach people in positions of power, authority, or influence in order to mobilize them to spread change and innovation downward through their "jurisdictions." On the other hand, the bottom-up approach seeks to cultivate a broad public constituency for desired change and is based on the belief that a "grass roots" movement is necessary (and probably sufficient) for change to occur. Our contacts have advocated either, and sometimes both, of these approaches. There seems to be no clear consensus on the question--a reflection of the fact that our collective knowledge about the process of social and institutional transformation is not great. Still, this is an important question that the Fund staff should consider as it formulates its grantmaking plans. Our inclination is towards the top-down strategy, but we do not discourage consideration of well-designed and potentially powerful bottom-up approaches.[44]

II.F. What Kinds of Postsecondary Education?

In this report, we speak of "postsecondary education" or "higher education" in aggregate terms. But of course there are many different kinds of postsecondary education: collegiate, non-formal, adult, proprietary, mass media, etc. The question of what kinds of postsecondary education should receive the Fund's support will have to be considered as the RBF staff proceeds to develop its educational goals. For a variety of reasons--access, contacts, visibility, our personal backgrounds, etc.--we have tended in this project to focus on collegiate institutions. We recommend that the Fund take as wide-angle an approach as possible, though, and seek to invest its resources wherever it has hope of achieving the maximum leverage.

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44. The Center for Growth Alternatives stresses the bottom-up approach.

III. AN ADEQUATE ECOLOGICAL EDUCATION.

In devising its future grantmaking strategy, RBF will need an idea or mental model of an educational process that will serve the goals described in the previous section. In this section, we suggest some key characteristics that we believe an "adequate" ecological education should have. The model suggested here is by no means comprehensive or final. Not everything mentioned here may be necessary, nor, on the other hand, may it all be sufficient. Our intent is merely to indicate what kinds of educational programs might be at least adequate to begin to carry out the goals mentioned above.

III.A. Curriculum Characteristics

A number of educational programs now in existence attempt to do part of what we believe is needed for an adequate ecological education; e.g., programs in environmental studies, urban studies, futures studies, systems science, System Dynamics, etc. However, we have discovered no programs which do all that is probably necessary. An adequate ecological education should be:

(1) Multi-level. It must function at all three major levels of "learning": Learning I, Learning II, and Learning III.[45]

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[45] See: Gregory Bateson. Steps to an Ecology of Mind. New York: Ballantine, 1972. "The Logical Categories of Learning and Communication." pp. 279-308.
Also see: Lewis J. Perelman. Elements of an Ecological Theory of Education. Doctoral Dissertation. Cambridge, MA: Harvard Graduate School of Education, 1973. Chapter 4.
According to Bateson, Learning I includes: (a) habituation; (b) classical or Pavlovian conditioning; (c) instrumental or Skinnerian conditioning; (d) rote learning; and (e) "extinction" of learning. "In a word, the list of Learning I contains those items which are commonly called 'learning' in the psychological laboratory." (Bateson, p. 288.)
Learning II is comprised of learning or cultivation of the skills of various forms of Learning I. In short, Learning II is "learning-to-learn." Learning II includes learning patterns of what Bateson calls "punctuating experience," which is equivalent to acquiring so-called character or personality "traits." The acquired premises of Learning II become the "paradigms" (See Appendix E)

(continued)

(2) Inter-disciplinary. It must span the boundaries between conventional disciplinary and professional fields. Sometimes this is called trans-disciplinary, or a-disciplinary, or non-disciplinary. We distinguish this from "multi-disciplinary" which often refers to a cafeteria approach that does not truly remove disciplinary barriers.[46]

(3) Problem-centered. It must focus on and be responsive to the critical problems of the "real world." It must consciously attack the threats to planetary survival, the constraints on human and ecological welfare, and the barriers to further planetary evolution and development.

(4) Futures-oriented. Rather than concentrating on the past and serving the 'status quo', it must be forward-looking and concerned with the imagination, design and realization of alternative, sustainable futures.

(5) Global. This means it must not be parochial, chauvinistic or provincial in its perspective. Rather, its perspective must be at least planetary, and probably also inter-planetary and cosmic.

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45. (continued)
through which we look at the world. But, Bateson notes, there is no "right" way to look at the world, just as there is no "right" way to look at an inkblot. This means that the premises of Learning II cannot be readily tested against "reality." Consequently, Learning II tends to be resistant to change.

Learning III throws open the largely unexamined premises of Learning II to question and to change. It is at the level of Learning III that the significant expansion and transformation of consciousness, or the "gestalt switch" of paradigm change, occurs. The crucial objective of Learning III should be not just the redefinition of the "self" but, beyond that, is attainment of a conception of "self" which is implicitly fluid and transmutable. (Perelman, pp. 440-41.)

46. See: Robert Straus. "Departments and Disciplines: Stasis and Change." Science, CLXXXII, 4115. 30 November 1973.
Also, see: Meadows and Perelman. Op. cit.

(6) Humanistic. That is, it must be concerned with the maximum realization, exploration, and expansion of what is commonly known as "human potential." This includes not merely the development of "cognitive" and "affective" skills, but also the development of the kind of physical competency associated with the control of physiological states through meditation, yoga, bio-feedback, conditioning, etc. as well as the kind of "spiritual" competency associated with psychic phenomena, altered states of consciousness, mystical and religious experience, etc.[47]

While not everything mentioned in this section may be necessary to ecological education, we do believe that these six characteristics are absolutely essential to an adequate educational response to our current state of ecological crisis. By this standard, virtually no educational program in existence today can be considered "adequate" to the times in which we live.[48]

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[47] See: Markley, et al. Op. cit.
Also, see: Duane S. Elgin. "The Third American Frontier--Proposed Strategies for Exploring Human Potentials." Menlo Park, CA: Duane S. Elgin, Stanford Research Institute, 1974.

[48] For additional ideas and reports on relevant educational processes, see:
Perelman. Op. cit.
Meadows and Perelman. Op. cit.
Harold A. Linstone. "A University for the Postindustrial Society." *Technological Forecasting,* I (1970), 263-281.
George McCully. "Multiversity and University." *Journal of Higher Education*. XLIV, 7. October 1973.
Edward J. Kormondy. "The Evergreen State College: An Alternative." (Position paper for the Annual Meeting of the American Council on Education, 10 Oct. 74.) Washington, D.C.: American Council on Education, 1974 (to be published in 1975.)
David Schimmel. "A Curriculum for Today and Tomorrow." *Changing Education*. Summer 1973.
Management Institute for National Development. *Global Development Studies: A Model Curriculum for an Academic Year Course in Global Systems and Human Development at the Secondary and Undergraduate Levels of General Education*. New York: Management Institute for National Development, 1973.
Robert E. Weber. "Human Potential and the Year 2000: The Futures Project of the New Jersey Department of Education

(continued)

III.B. Curriculum Content

It is beyond the scope of this report to discuss in detail curriculum content to fit the six general characteristics described above. A large, if not infinite, number of different curricula could probably be developed to satisfy these criteria. We have found no curriculum currently in use with all these characteristics. Figure I (next page) is a crude attempt to suggest what the content of an adequate ecological curriculum might look like. The constellation of ingredients depicted in this figure is neither complete nor even necessarily satisfactory. We offer it here merely to suggest the kinds of pieces one might try to put together in designing curricula for an adequate ecological education. While the experience and materials for most potential components of an adequate ecological education already exist, the skills and materials required to put these pieces together into a comprehensive and conceptually-sound whole ecological curriculum are virtually nonexistent.

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48. (continued)
--Part I." Journal of Creative Behavior, VII, 2. Second Quarter 1973.
Thomas Carleton. Futures Lab Prospectus. Earthrise Document ER-8. Providence, RI: Earthrise, 1974.
Center for Educational Research and Innovation. Environmental Education at the University Level: Trends and Data. Paris: Organization for Economic Cooperation and Development, 1973.
Jayne C. Millar. Focusing on Global Poverty and Development; A Resource Book for Educators. Washington, D.C.: Overseas Development Council, 1974.
Richard J. Myshak. "Community Environment Studies Programme." Prospects, II, 4. Winter 1972.
Sheldon Eisenberg. "A Proactive, Developmental Curriculum." Impact, III, 1.
Priscilla Laws. "The Physical Scientist in an Interdisciplinary Course." AJP, XLI. June 1973, 808-812.
John Fischer. "The Easy Chair: Survival U is alive and burgeoning in Green Bay, Wisconsin." Harper's. February 1971.
Alvin Toffler (ed.). Learning for Tomorrow: The Role of the Future in Education. New York: Random House, 1974.
Chris Argyris and Donald Schon. Theory in Practice: Increasing Professional Effectiveness. San Francisco: Jossey-Bass, 1974.

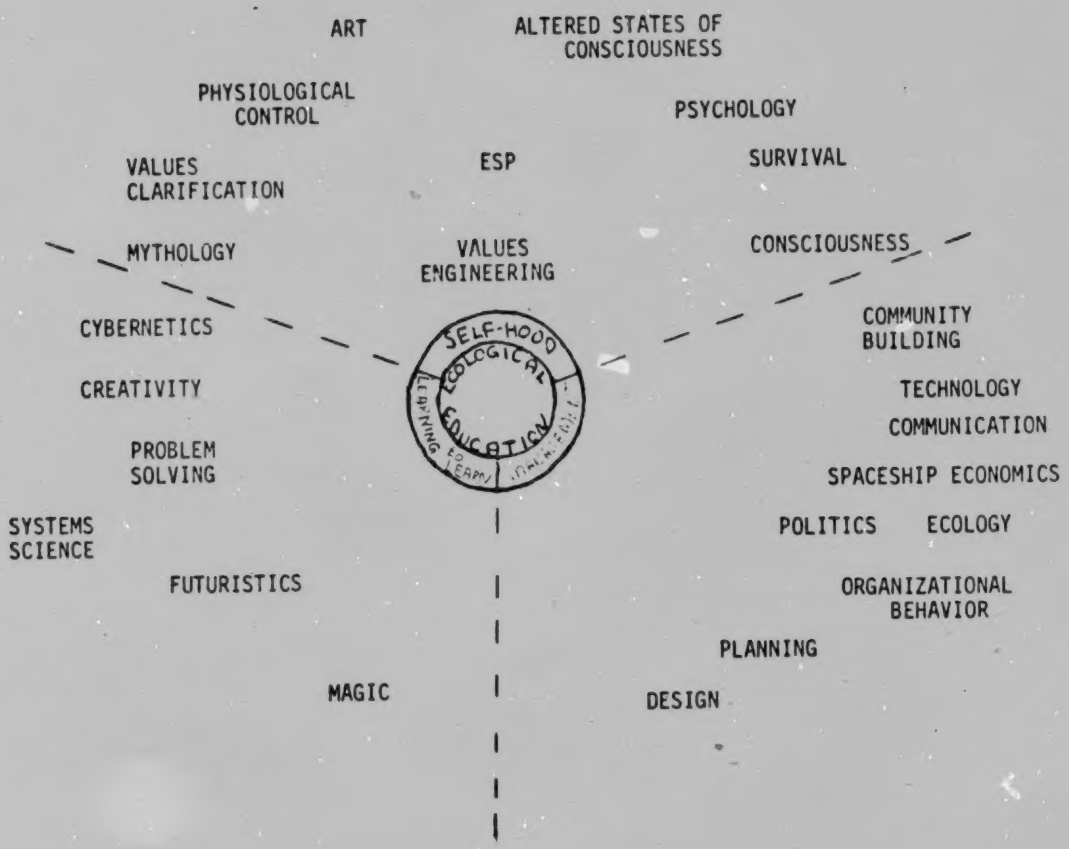
ART
ALTERED STATES OF CONSCIOUSNESS
PHYSIOLOGICAL CONTROL
PSYCHOLOGY
VALUES CLARIFICATION
ESP
SURVIVAL
MYTHOLOGY
VALUES ENGINEERING
CONSCIOUSNESS
CYBERNETICS
COMMUNITY BUILDING
SELF-HOOD
ECOLOGICAL EDUCATION
LEARNING TO LEARN
CREATIVITY
TECHNOLOGY
COMMUNICATION
PROBLEM SOLVING
SPACESHIP ECONOMICS
SYSTEMS SCIENCE
POLITICS
ECOLOGY
FUTURISTICS
ORGANIZATIONAL BEHAVIOR
PLANNING
MAGIC
DESIGN

FIGURE I

III.C. Process Characteristics.

Our discussion of curriculum has so far concentrated on content, but we are also concerned with the process of an adequate ecological education. We have identified five process components or characteristics that we think especially important. These are:

(1) Micro and macro utility. An effective ecological education should have practical value at both the micro and the macro levels. That is, it must be helpful both to the individual in dealing with critical personal problems, and to society as a whole in dealing with critical collective problems. An educational process which serves only the individual, or only the society, and ignores the other, is destined to fail.[49]

(2) Fun and play. This characteristic was implicitly recognized in our Working Paper but was especially emphasized by Arthur Harkins in Perelman's conversation with him. The process of ecological education should be fun, and the process should, to a significant extent, be playful. An educational process which can help us avoid a somber and scary future need not itself be somber and scary. On the contrary, a process which is somber and scary will turn people off and will not engage the enthusiastic participation of the people it must engage to be effective. Also, only by being playful can the process fully unleash the kind of creativity required to design and realize sustainable futures. This does not mean that the process should be euphemistic or hedonistic. It does not mean that it can never be serious or frightening. It does mean that, in

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[49] Many macro-level problems have their roots at the micro level, and vice versa. For example, the macro level problem of population growth has its ultimate roots in individual knowledge, attitudes, and behavior concerning reproduction. On the other hand, many apparently individual problems--from psychological depression to lung cancer-- really have their cause and cure at the macro, or societal, level.

general, the process should be enjoyable; that it should engage participation through positive rather than negative reinforcement; that it should be creative, imaginative, exciting.[50]

(3) Emphasis on alternatives. Another point touched on in the Working Paper, but further emphasized by Harkins, is that the process must emphasize alternatives.

In the transformation to equilibrium, the most critical need now is for settings in which growth alternatives can be both "tried out" and "tried on." And it should be emphasized that when we speak of growth alternatives we mean not only economic or technological alternatives, but also political alternatives, social alternatives, cultural alternatives, alternative values and alternative realities. The salient characteristic of the kinds of new experimental/experiential settings needed for the process of ecological education is that they create, provide, and evolve comprehensive social/ecological alternatives.[51]

(4) Harmony between social/physical structure and content. Perhaps one of the most important discoveries we made in the course of this project is of the critical relationship between social structure (i.e., the structure of relationships among trustees, faculty, administrators, staff, and students) and physical structure (physical plant, energy system, food service, etc.) of an educational setting on the one hand, and the curriculum on the other. This was underscored by the qualitative contrast in Perelman's experiences at the College of the Atlantic (COA) and the University of Wisconsin at Green Bay (UWGB). These are two institutions whose curricular philosophy is very similar and whose curricula both reflect the theme of "human ecology." At COA, a conscious effort has been made to create a physical and social community that is harmonious with the philosophy expressed in

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[50] Perhaps the ethos of ecological education should be "picaresque." See: Joseph W. Meeker. The Comedy of Survival. New York: Scribners, 1974.

[51] Working Paper, p. 80.

the curriculum. UWGB, on the other hand, is from a physical and social standpoint virtually indistinguishable from any other typical state university campus. The harmony between process and content at COA is impressive, especially in contrast to the conflict between the setting and the curriculum at UWGB. COA is not an ideal example, nor is it a model that every other higher education institution can readily emulate. However, this experience served to demonstrate that the more harmonious the setting of ecological education can be made with the curriculum, the more effective the educational process will be.

(5) Emphasis on experience. All of the different new kinds of educational institutions that are possible and are needed in general would emphasize the concept of an educational institution as an experimental/experiential setting. There is a need for settings where alternatives to existing growth-based systems are not only developed in theory, but also where these alternatives can be experimented with and developed in practice, and where real human beings can actually experience them to see how they "fit". As E. F. Schumacher put it in one of our conversations, the need is to make "viable alternatives visible."[52]

Beyond the general need for including experience in the design of growth alternatives, effective education for competent "transformers" must include major experiential components. Many different kinds of experience that might be included in the process of ecological education can be imagined, but at least three general types are worth mentioning here. First is the apprenticeship experience acquired by working in "real world" settings (e.g., Public Interest Research Groups, internships, field work, etc.). Second is the learning experience acquired in "simulated" or "sheltered" settings (e.g., alternative campuses, experimental communities, or smaller-scale settings like T-groups, games, simulations, etc.). Third is the personal experience which can lead to the expansion of consciousness (e.g., Transcendental Meditation, Silva Mind Control, Erhard Seminars Training, Arica Institute, Outward Bound, etc.).

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[52] Ibid.

IV. RESOURCES AND NEEDS.

A major objective of this project was to make a preliminary assessment of the resources currently available to the "beyond limits" community and to get an impression of what was needed for the further development of its work. In the terms of this report, the objective was to try to find the "leverage points" in the postsecondary education system which could make RBF's investment of limited resources maximally effective.

With the limited money, time, and staff of this project, the assessment of the postsecondary education system we were able to do could be neither comprehensive nor final. In this section we offer our impressions, based on our admittedly incomplete study, of critical needs for the advancement of "beyond limits" education and research. By implication, the prospects for "leverage" are contained in this assessment of "needs." In section V, a few specific projects which RBF might wish to support are suggested, based on the consideration of "needs" and "leverage" contained here.

IV.A. The Ingredients of Leverage: The Postsecondary Education System Evaluated

In section I.D., we offered a list of six key ingredients for "leverage," expanding on the notion of "institutional 'readiness'" already suggested by Dietel and Barney. Here we present an impressionistic evaluation of the current postsecondary education system in regard to these six items.

(1) Interest. Interest in "beyond limits" kinds of research and education seems to be high and widespread. Both in our research and our interviews and visits, we found many individuals and institutions throughout the U.S. and elsewhere in the world who are interested in, and actually doing (or at least attempting to do) research and teaching that fit some if not all of the charact-

eristics mentioned in section III.A. Most people we talked with in connection with this project felt that the subject of our inquiry was important. Many people expressed interest in the results of our study and/or wanted to know about other people, institutions and resources related to the "beyond limits" area that we might have discovered. As indicated in section I.C., there is enormous interest in the higher education community today in the "limits to growth of higher education" and this interest tends to be matched by a receptiveness to, and an interest in exploring the other side of the LTG/HE question as well. People involved in government policy-making or those doing research related to the problems of growth and equilibrium were concerned about the contribution of education to the solution of these problems. In general, interest seems to be the least limited ingredient for leverage.

(2) Understanding of the nature of the problem. By contrast, we found little evidence of informed understanding of the nature of the problem presented by the "beyond limits" school. Although interest is relatively high, it is so far unaccompanied by a thorough conceptual grasp of the problem and its implications for postsecondary education. Many people whom we met, or about whose work we read, display a partial or nearly-adequate conception of the problem that is useful, as far as it goes. As we indicated in section III.A., we did not find any educational program which satisfies all the criteria of an adequate ecological education. There are a number of programs that are interdisciplinary, or problem-centered, or futures-oriented, etc., and even a few that combine two or more of these characteristics; but none, to our knowledge, which combines all. A few people we have encountered do share a conception of the educational problem which is essentially similar to that of this report. But because of professional, institutional, financial, or other

constraints, or perhaps because of flawed or limited perspective, none has yet implemented the broadly "ecological" educational program called for here.[53]

(3) Instructional materials/techniques--i.e., curriculum--appropriate to the educational goal.[54] The essential ingredients

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[53] See sections II and III.

Some people whom we believe would more or less share the conception of the educational problem contained in this report are: David Kline (Center for Studies in Education and Development, Harvard Graduate School of Education); Paul Ylvisaker (Dean, Harvard Graduate School of Education); Bob Sweeney (System Dynamics Group, Massachusetts Institute of Technology); Dennis and Dana Meadows (Thayer School of Engineering, Dartmouth College); Al Converse (Thayer School of Engineering, Dartmouth College); Paul Niebank (Provost, College VIII, University of California at Santa Cruz); Ed Weidner (Chancellor, University of Wisconsin at Green Bay); Dave Steffenson (University of Wisconsin at Green Bay); Ed Kaelber (President, College of the Atlantic); Enno Becker (Student, Organizer of the World Systems Workshop, College of the Atlantic); Joel Barker (Future Studies Department, Science Museum of Minnesota); Harold Shane (University of Indiana); Harold Linstone (Systems Science Department, Portland State University); Roy Lieuallen (Chancellor, Oregon State Higher Education System); Bill Eberly (Environmental Studies Institute, Manchester College); Don Michael (University of Michigan); Willis Harman (Stanford Research Institute); Sir Geoffrey Vickers (Division of Study and Research on Education, Massachusetts Institute of Technology); Gregory Bateson (Kresge College, University of California at Santa Cruz); Priscilla Laws (Dickinson College); Craig Houston (Dickinson College); Lew Auerbach (Producer, Ontario Educational Communications Authority); Arthur Porter (Industrial Engineering Department, University of Toronto); Jørgen Randers (Resource Policy Group, Oslo, Norway); Frank Potter (Counsel, Committee on Merchant Marine and Fisheries, U.S. House of Representatives); Michael Washburn (Director, Institute for World Order); Alan Poole (Institute for Public Policy Alternatives).

[54] See discussion of educational goals in section II.

of a well-developed ecological curriculum are: (a) appropriate instructional materials that have been developed through trial, evaluation, and revision; (b) appropriate instructional techniques, also tested and revised; and (c) people who are experienced and/or trained in the use of these materials and techniques. While these do not exist for ecological education as a whole, they do exist for most component areas, e.g., systems science, planning, futuristics, environmental studies, communication, "consciousness-raising,"[55] etc. On the other hand, since many of these component areas are themselves relatively young, their curricula are generally raw and frequently in need of further development and refinement. But the critical need is for further development of these curricula in some integrated manner which can lead to the evolution of a whole ecological curriculum. In addition, a crucial need in all of these component curriculum areas is for evaluation. We have found very little literature on evalution of educational programs in most key component areas. However, enough curriculum experience and materials exist to make the creation of a prototype curriculum for ecological education feasible. The major needs (in this order) are: integration, application, evaluation, and dissemination.

(4) Models of educational settings consistent with and conducive to the curriculum. Both sides of the LTG/HE question[56] imply substantial change in the institutions of post-secondary education, in response both to changing conditions in higher education itself and to the critical problems facing society as a whole. This is not to say that great public universities, small private liberal arts colleges, community colleges or other conventional educational institutions must or will cease to exist. But it does suggest a major qualitative

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[55] See section III.B.

[56] See section I.C.

change in the nature of these institutions, and of postsecondary education as a whole. The overall need is for an educational system more consistent with the characteristics of an adequate ecological education we have identified; that is, a postsecondary education system which is multi-levelled, interdisciplinary, problem-centered, futures-oriented, global, and humanistic. This system change implies not only major adaptations of existing educational institutions, but in many cases, the creation of whole new educational institutions.[57] As noted above,[58] the practical need is for models of educational institutions as experimental/experiential settings that are harmonious with the goals and processes of ecological education.[59] By "models" we mean both conceptual models (detailed ideas of plans for new educational settings) and empirical models (settings that have actually been created). Surprisingly, our experience in this project has suggested that there are few of either. As Pat Sullivan noted during his conversation with Perelman, much of the so-called innovation in higher education in recent years has been "showmanship," and there has been relatively little critically-designed and meaningful change.[60]

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[57] See our Working Paper, "Education Institutional Needs."

[58] See page 28.

[59] See section III.C.

[60] A few innovative model settings do exist: the College of the Atlantic; the University of Wisconsin at Green Bay; the new College VIII at the University of California at Santa Cruz; Evergreen State College; Prescott College; Hampshire College; Worcester Polytechnic Institute.

Some farther out examples: The Lindisfarne Association (William Irwin Thompson); Empire State College; the University of California at San Diego's courses through newspapers; the University Without Walls; Esalen Institute; the Aspen Institute for Humanistic Studies; the Committee for the Future's New Worlds Training and Education Center, and CFF's "Syncons"; the United Nations University; Habitat Institute.

(5) Organizational Development (OD) resources--'know-how' and competent consultants--appropriate for facilitating the changes and innovations implied by (4). The rapid growth of higher education in the past 15 to 20 years has been attended by an increasing interest in improving the management of educational institutions in order to increase both the efficiency and effectiveness of educational enterprises. Not surprisingly, higher education has tended to try to adopt the scientific management practices of the modern business firm. Most notable in this regard may be the efforts of the National Center for Higher Education Management Systems to develop the skills and technology required to improve the management of colleges and universities. Also, there has been a growing interest in higher education in following the example of many business firms to create organizational development units within the organization and/or to call in professional consultants to assist in the tasks of managing innovation and increasing organizational effectiveness. Several universities (e.g., the University of Cincinatti, the University of Massachusetts) currently incorporate OD services in their administrative structures. Although these efforts constitute promising beginnings, knowledge and skills in higher education management and organizational development are limited in quality and tend to be localized within the institution of origin. In the non-collegiate sector, while proprietary (profit-making) institutions are,by their very nature, more business-like in their operation,on the whole the available modern management and OD resources are probably as limited as those of the collegiate sector.

Furthermore, as limited as existing management and OD resources in higher education are, most of these are probably already obsolescent. Both sides of the LTG/HE phenomenon[61] imply several years of turbulent change in the postsecondary education system. This era of rapid and dramatic change is already posing problems of management and development in educational organizations

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61. See section I.C.

whose solutions generally cannot be found in historical precedent or the experience of the business world. Existing OD 'know-how' and manpower are simply inadequate to the task of change which lies ahead. This deficiency constitutes a critical need which must be met if RBF, or anyone else, expects to have creative leverage on the future evolution of the postsecondary education system. Specifically, the need is for (a) research on the dynamics of change in the postsecondary education system[62] combined with (b) training and continuing education of OD professionals who can understand and help facilitate the kinds of changes and innovations implied by "limits to growth."

(6) Incentives for (3) and (4) to be implemented. The creation of new educational curricula and settings will not be successful unless there are adequate incentives for the principal actors involved--students, faculty, and educational administrators--to adopt the changes required. Many interdisciplinary and other innovative programs attempted on campus in recent years have failed, because theywere irrelevant to or incompatible with the reigning incentive structure of the institution. Participation in these programs is, from the outset and for all involved, an uphill struggle which eventually leads to "burnout," decline, and demise. Because incentives are such a critically important ingredient of leverage, we present a detailed list of some incentives needed for the promotion of ecological education in section IV.B.

Beyond the need for these specific incentives is a general need for an effective demand for the products (research and manpower) of an innovative postsecondary education system.

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[62] A System Dynamics approach would seem desirable; probably needed. See section V.F.
Some limited examples of System Dynamics studies in postsecondary education are:
Michael S. Garet. "Educational Policy and System Dynamics." Journal of Research and Development in Education. Winter 1974.
Willard R.Fey and John E. Knight. "The Dynamics of Educational Institutions." Proceedings of Summer Computer Simulation Conferences. La Jolla, CA: Simulation Councils, Inc., 1973.

Our impression from work on this project is that demand for the research products and trained personnel that such a system would produce already exists and can be expected to grow. People directing almost-adequate ecological education programs--Jay Forrester, Dennis Meadows, Ed Weidner, Art Harkins, Harold Linstone--have indicated that their graduates are in demand and generally have little trouble getting jobs. If true, this is significant, given the extremely unfavorable job market graduates in more traditional disciplines now face. Our contacts with the business world indicate that many business leaders are aware of and concerned about "limits to growth," and are desperately looking for people who are competent to guide business through the transition to a "no-growth" economy. In a depressed economy, "environmental protection" and resource-related industries (e.g., energy, mining, agriculture) seem to be major growth areas. In government at all levels, long-term planning and environmental policy (e.g., land-use, pollution control, conservation, public health, etc.) seem to be areas with a growing demand for competent personnel. In general, it seems that the demand for the things that ecological education could produce is already substantial and--given just about anybody's image of the "most probable future"--is almost certain to increase.

In summary, most of the necessary ingredients of leverage already exist, and exist at adequate levels to make meaningful change possible. Of the six key ingredients discussed above, only OD resources seem to be limited to an extent that is troublesome.[63] By far, the greatest obstacle to achieving significant leverage on the postsecondary education system is that there is apparently no place where all of the ingredients of leverage come together. That is, there are no discrete "soft spots" or "leverage points" where all of the necessary ingredients are integrated effectively. Like the gears and springs of a disassembled clock, the key ingredients for leverage are dispersed in a way that is not yet functional. Only when the parts are brought into active communication within some integrated system can meaningful movement occur. As we see it then, the challenge facing the Fund is either to become or to create a watchmaker who can put the pieces of the clock together and make it tick. We do not doubt that this can be done; but it will require determination, skill, and creativity, not just money.

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[63] The major lack there seems to be more one of understanding and direction than of skill and technique. A moderate effort at educating OD and educational management professionals about the "limits to growth" problem could probably expand the utility of existing OD resources considerably.

IV.B. Incentives.

Returning to the discussion of incentives begun in section IV.A., we have developed a more detailed list of some important incentives that are needed to achieve leverage on today's postsecondary education system. These include student incentives, faculty incentives, and administrator incentives.

(1) Student incentives.

Some major incentives which would help to attract studentsto innovative programs in ecological education are:

(a) Sense of relevance. Programs should project a sense of relevance to the future, and of service to society.

(b) Work opportunities. Programs should provide meaningful work opportunities in conjunction with training: e.g., internships, field projects, public interest research groups, etc.

(c) Viable employment credentials. Programs should provide their graduates with credentials that have high face validity in the job market. Program directors should develop placement services to direct competent graduates to employment opportunities.[64]

(d) Scholarships/fellowships. Programs which can provide financial support for students are obviously going to be attractive.

(e) High academic standards. Programs which confer prestige on their students and graduates will attract more and better students.

(2) Faculty incentives.

A Delphi survey conducted by the Western Inter-State Commission for Higher Education indicated that faculty are generally perceived to be by far the greatest obstacle to innovation and change in higher education.[65] The following are some incentives that could help to mobilize faculty support for innovative ecological education programs:

(a) Profit/prestige. Programs will receive more enthusiastic faculty support if they provide participating faculty with opportunities for profitable and/or prestigious extramural activities: e.g., consulting, input to government, etc.[66]

(b) Opportunities for publication. The "publish or perish" syndrome in higher education has been perennially condemned; but, whether it is a good thing or not, it continues to exist. A significant constraint on the development of non-traditional, interdisciplinary, etc. areas of higher education has been the relative scarcity of journals in these areas in which faculty could publish. For

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[64] The employment problem seems to be the major concern of students in higher education today. This is not surprising in light of recent Labor Department statistics which showed that the probabilities of a new entrant into the labor force finding a job are only about 1 in 3.

[65] Vaughn Huckfeldt. A Forecast of Changes in Postsecondary Education. Boulder, CO: Western Interstate Commission for Higher Education, 1973.

[66] For example, Chancellor Roy Lieuallen of the Oregon State Higher Education System is working for the creation in Oregon of a public council that would work on identifying the critical "survival issues" facing Oregon in the future.

(continued)

example, in the "futuristics" field, there are only a handful of major periodicals[67] The same is true in the field of "environmental studies," [68]other component areas of ecological edcuation, and certainly ecological education as a field itself.[69]

(c) Access to funds. Funding agencies should require that programs or institutions seeking or receiving support demonstrate their commitment to developing and providing adequate ecological education.[70] Some higher education administrators might wish to fight for similar priorities in the allocation of their institutions' "hard-money" budgets.

(d) Direct Support. Funding agencies should also seek out, encourage the development of, and provide direct support for innovative programs designed to provide an adequate ecological education.[71] However, direct support of such teaching/research programs should always be tied to and contingent upon institutional commitment to long-term support and survival of the programs. In other words, direct support from outside agencies should only be used as "seed" money.

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66. (continued)
This body could be used as a powerful lever for innovation in the state higher education system by having the council's research and consulting work farmed out to those faculty with a demonstrated commitment to interdisciplinary, etc. teaching and research.

[67] For example: The Futurist; Futures; Technological Forecasting and Social Change.

[68] For example: Environment; Environmental Affairs; Science.

[69] The Journal of Environmental Education is very inadequate. We know of no major journals explicitly devoted to futures education or interdisciplinary studies.

[70] See section III.A.
One powerful way this could be done would be for the
(continued)

(3) Administrator incentives.

Some incentives which could help to encourage administrative endorsement and support of innovative programs in ecological education are:

(a) Cost-effectiveness. Programs demonstrably using the resources of the institution in a cost-effective manner will be more attractive to administrators.

(b) Institutional attractiveness. Programs which demonstrably enhance the attractiveness and/or prestige of the institution will be more readily supported by administrators.

(c) Faculty/student acceptance. To receive administration endorsement, programs in ecological education will have to demonstrate that they enjoy at least the acceptance, preferably the support, and hopefully the enthusiasm of faculty and students.

IV.C. Survey Results.

Part of the process of this study was a survey by mail of several hundred individuals whom we felt had interests or expertise relevant to the project.[72] In one of the questions we asked our respondents to identify and rank critical resources needed for their work. We provided a list of fif-

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70. (continued)
U.S. Office of Education to require higher education institutions receiving federal funds to demonstrate their consideration of "environmental impact" in both their curricula and institutional management practices. To our knowledge, OE does not now do this, but the National Environmental Policy Act suggests that it has both a mandate and an obligation to do so.

71. See section III.A.

72. The general results of the survey are described in Appendix D. The responses of those who filled out our second questionnaire are compiled in the Resource Directory (Supplementary Document #1).

teen items and asked the respondent to rank each for its importance on a scale from 1 (not relevant) to 5 (essential).

The results of this part of our survey are summarized in Figure II (next page). The items which received both the highest number of "5" ratings and the highest average scores were: (a) Money; (b) Trained Personnel; (c) Direct Communication ;[73] and (d) Public Recognition and Support. While some of the items in our list received relatively low ratings compared to these top four (e.g., A/V Materials, Resource Directories, etc.) it should be noted that every item in the list received at least some "5" ratings. This means that every item mentioned in Figure II[74] represents an "essential" need for some members of the "beyond limits" network.[75]

IV.D. Four Constraints.

Here, we discuss the issue of leverage in terms of four key constraints on the achievement of innovation relevant to "limits to growth" and higher education. We developed this list of four constraints from the discussion of a group of scientists, educators, foundation staff, etc. assembled at Dartmouth during the System Dynamics Institute to talk about this project. The conversation tended to focus on the need for proliferation of System Dynamics teaching and research in higher education, but the basic conclusions seem to be relevant to ecological education as a whole. The four key constraints or obstacles the group identified were:

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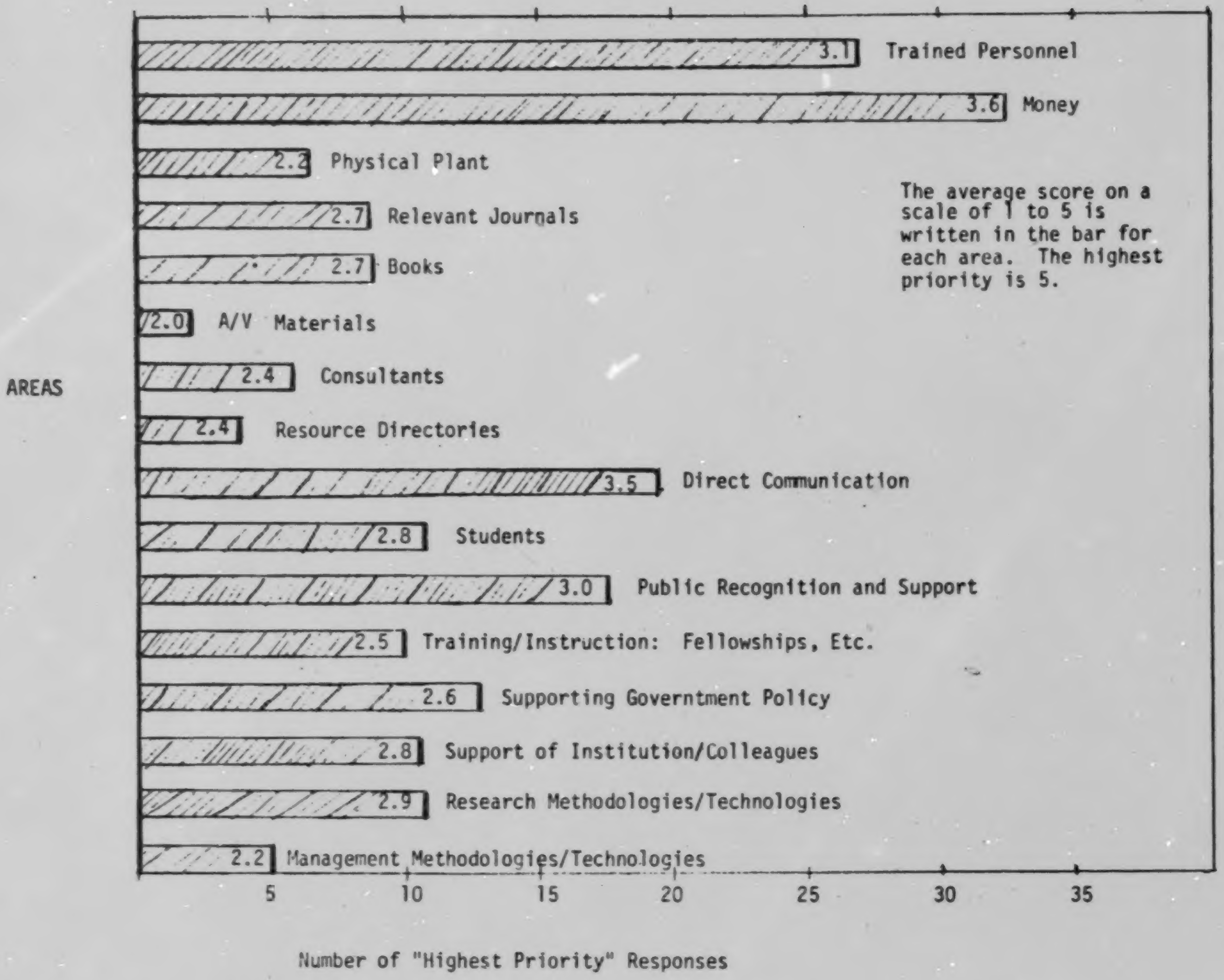
[73] "Direct Communication with other people working in the area of concern (conferences, networks, etc.)."

[74] As well as some others that were added under "Other."

[75] This fact is probably more significant than the relative ratings depicted in Figure II, since our respondents were not a scientifically-selected sample of the "beyond limits" community; which, furthermore, is not a well-defined universe.

FIGURE II



The average score on a scale of 1 to 5 is written in the bar for each area. The highest priority is 5.

(1) Human resources. Specifically, it was recognized that there are not enough people trained in System Dynamics to satisfy the demand for course instructors or even the demand for curriculum development. The same situation exists in many other component areas of ecological education, and is certainly true for ecological education as a whole.

(2) Time. There are two aspects to this constraint. First, there was the feeling among this group[76] that there simply might not be enough time for education to lead to constructive change before disaster strikes.[77] Second, there was the very important recognition that the expert individuals whose input would be required in a quality curriculum-development effort were very busy people who had little time to spare for such an endeavor. This seems to be a generally valid rule of thumb: people who do not fancy themselves professional "educationists" will commonly endorse the need for curriculum development but will rarely invest much of their own time and energy in the process, unless there are powerful incentives (e.g., money, tenure, released or sabbatical time, etc.) for doing so.

(3) Money. There is virtually no money available for curriculum development in System Dynamics, nor in most of the other component areas of ecological education,[78] nor

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[76] Who had just been treated to 2½ hours of Jay Forrester's gloomy projections of the future of the U.S. economy.

[77] Forrester had talked in terms of a 15-year program of research, development and education. This long time horizon surprised many of the participants in the institute, in light of Forrester's gloomy image of the future. Perelman later discussed this with Forrester by phone and discovered that he had taken the figure of 15 years as a sort of working hypothesis. That is, Forrester figured that if we didn't have 15 years before catastrophe would strike, it wouldn't matter what we did, since there was nothing we could do in less than 15 years that could make much difference. As Forrester put it: "I suppose if you believed the world was going to end in two or three years, it would make sense to try to do something to prevent it; but I don't know what one would do about that, nor do I know of anyone who does."

in ecological education as a whole. In fact, funds for curriculum development in postsecondary education generally are pretty scarce, especially for such major developmental efforts as those we recommend.

(4) Content. We have few if any answers to most of the urgent questions about growth and equilibrium. The answers that we do have for the most part are in the nature of processes rather than solutions. In other words, we have some ideas now about processes that may make people more effective in finding solutions to the many problems of ecological crisis, but we have no simple prescriptions or canonical solutions to teach our students. This fact is often frustrating and confusing to many of those anxiously seeking answers, especially people in business and government who have become accustomed to seeking and finding packaged solutions.[79]

IV.E. Two Qualitative Needs.

Two important qualitative needs for change were touched on in our Working Paper and were strongly emphasized by Art Harkins in his conversations with Perelman. These seem worth mentioning here.

First is the need to communicate across disciplinary, cultural and, in general, paradigmatic[80] boundaries. Harkins argues that the language for this kind of "meta-communication" is probably a synthesis of general systems theory and cybernetics.[81] If this is so--and we are in-

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[78] Note that the Environmental Education Act provides federal money for curriculum development at the elementary and secondary level but not at the postsecondary education level; nor does any other federal program provide such support.

[79] Willis Harman indicated that this has been a common occurrence in some of the executive seminars he has conducted.

[80] For more on "paradigms" see Appendix E.

clined to agree--then it implies a need for vastly more widespread training in this "language".

Second is the need for more positive, even in some sense "erotic," images of growth alternatives. From Harkins' viewpoint, the qualitative image of the future projected by the "no-growth" school is puritanical, conservative, agrarian, austere, and generally dull. Much of the literature of the "no-growth" movement seems to justify Harkins' impression.[82] This point is more than merely esoteric. The success of the "beyond limits" community will hinge on its ability to come up with "equilibrium" futures which are not only technically sustainable, but which are patently attractive.

IV.F. The Essential Need: Meta-Institutional

In light of everything stated so far, we believe that the most essential need is for the creation and development of one or more educational "meta-institutions," based in part on Schon's network concept[83] and explicitly devoted to the creation of an adequate ecological education[84] at the postsecondary level.

By "meta-institution," we mean a setting organized to functionally span the boundaries between conventional institutions. Such a setting works by facilitating and managing the activities of a network of individuals and institutions who share a community of interest, in this case, that community of interest which we earlier identified as "beyond limits."

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81. Maruyama has written extensively on this. See Appendix E.

82. See works by Meadows, Goldsmith, Ferkiss, Pirages and Ehrlich, Daly, and Wagar cited in footnote #14. Wagar's image, if somewhat ridiculous, is also more imaginative in its advocacy of space exploration.

83. See: Schon. Op. cit. pp. 190-200.

84. See section III.

There is, to our knowledge, no organized setting[85] which is (a) expressly concerned with the problem of transformation from a state of ecological crisis to a state of equilibrium, and (b) capable of providing or facilitating the "ingredients of leverage," or generally servicing the needs identified in this report, that meaningful change and innovation in the postsecondary education system would require. Without the catalytic assistance of such a meta-institution, the process of transformation in educational institutions--and by implication in other social institutions--will be slow in coming, erratic, and far more crisis laden than it need be.

There are several reasons why the creation of such an educational meta-institution is both justified and needed. First, while an informal "beyond limits" network is already in existence, and does seem to be growing, we feel that the inchoate network needs some kind of "central facilitator"[86] to become really productive. Most members of this network with whom we talked share this feeling, explicitly or implicitly.

Second, while the higher education system is in a state of inexorable change, this change must be directed properly if the postsecondary education system eventually is to provide an adequate ecological education. That is, creation of an ecological education requires not merely cosmetic changes in higher education, but fundamental changes in curricular philosophy and institutional structure. In other words, the kind of change required is of the kind Watzlawick et al call "second-order change"[87] or what can be seen metaphorically as a kind of Kuhnian "paradigm shift."[88]

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[85] Or even a competent individual working on a full-time basis.

[86] See: Schon. Op. cit. pp. 189, 199.

[87] See footnote #5.

[88] See our Working Paper, pp. 78-80. Also, see Appendix E.

While this change could happen spontaneously, it is far more likely to occur if a small but competent group is organized to actively promote it.

Third, for change to occur, three kinds of activities must take place, but in an integrated manner. One is networking to bring all of the necessary ingredients of leverage into active communication. Another is research on curriculum design and on the structure and dynamics of educational settings and systems. The third is the development of new curricula and and of new models of educational institutions. The integration of these three kinds of activities virtually defines the kind of educational meta-institution we advocate here.

Finally, the pioneer effort which the present project represents has barely scratched the surface of what needs to be learned and what needs to be done about the problems which it has addressed. This initial work cannot be significantly advanced without the creation of a critical mass of people and resources devoted to it, and a continuous effort sustained over a significant period of time (i.e., at least five years).[89]

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[89] In their conversation, Perelman discussed this idea with Chris Argyris. Argyris agreed with the suggestion that a critical mass and continuity of effort were required for the promotion of meaningful change in higher education. Argyris recalled research by Deutsch which showed that major social innovations have predominantly been the product of on-going, small groups.

V. PROJECTS

The final section of the report begins with some general suggestions for RBF's funding strategy as it proceeds to request and fund proposals. We suggest a few projects which the Fund might wish to consider supporting as follow-up to this study. These potential projects are presented in approximate order of priority and scope.

We have consciously chosen to de-emphasize recommendations for specific future projects in this report. While we could present a large number of suggestions for particular projects,[90] we want to avoid leading the Fund into the pitfall of "disjointed incrementalism."[91] Coordination and integration have been major concerns of our study and central themes of this report. To conclude with a smorgasbord of narrowly-defined and unrelated project proposals would therefore be inappropriate. The few potential projects we do recommend here have been chosen on the basis of their responsiveness to the needs this report identifies, and their appropriateness as "next steps" to follow the present project.

V.A. General Funding Strategy

The most general recommendation we make here is that the Fund look in any project it considers supporting for "multiplier effect." That is, in weighing proposals, the staff should ask: How is this project going to integrate the necessary ingredients of leverage?[92] How will it service other critical needs for change?[93] Most important: How will this effort become self-sustaining or help to mobilize the application of other, greater resources toward our educational goals? Given its limited funds, RBF should direct what it has into projects that--even if they cannot promise to have immediate "leverage" on the postsecondary educational system--are most likely to create or mobilize additional resources or ingredients of leverage.[94]

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[90] Additional ideas for action are in Appendix G. Also, see: our Working Paper, Ch. 4; Bergquist's comments in Appendix H; and statements from national commissions in Appendix I.

[91] See section I.A., "Assumption #2." Also, footnote #5.

[92] See section IV.A.

[93] I.e., mentioned in section IV.

In general, the Fund will probably want to--and be wise to--avoid making long-term commitments of its limited funds. Otherwise, it may "paint itself into a corner" and not have any discretionary funds available to support important projects that may come up sometime in the future. On the other hand, some long-term commitments may be necessary in those areas of activity where momentum and continuity of effort are essential. Consistent with the concept of "multiplier effect," whenever possible, funds should be offered on a matching basis.

Given its limited resources, the Fund may be naturally hesitant to get into "institution-building." With the amount of money it has available, the Fund probably could not do much in the way of direct institution-building anyway. But this report indicates that some institution-building is critically needed, and the Fund could, in fact, use some of its funds to be helpful in this. Specifically, it could allocate funds for indirect institution-building, by providing "seed money" for the financial and organizational development of one or a few new institutions for which a clear need exists.

An important choice facing the Fund's staff is whether to allocate its funds on a discrete project basis, or to operate in some kind of an integrated, network mode. The strong preference of this report is for the latter. This means that the Fund would either have to develop some "meta-institutional" capacity within its own offices, or would have to help create the kind of independent meta-institution mentioned in section IV.F which could then serve on a continuing basis as a consulting agency to the Fund on its grantmaking activities.

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[94] To put it cybernetically, look for projects that incorporate positive feedback loops connected to the ingredients of leverage in the postsecondary education system.

Finally, it could be very helpful for RBF to allocate a small part of its funds to supporting the planning and development of proposals for major projects which would be beyond its capacity to support. This is a strategy which could have significant "multiplier effect."

V.B. Ecological Education Project

The first project recommended is the creation of the kind of meta-institution mentioned in section IV.F. For simplicity, we will call this new meta-institution the "Ecological Education Project" (EEP). The general function of the EEP would be that described in section IV.F. Its major activity would be the facilitation and management of the "beyond limits" teaching/research network. It would also integrate this activity with specific educational research and development activities that would contribute to the creation of an adequate ecological education. In other words, it would generally work to further the educational goals and processes suggested in sections II and III of this report.

The precise nature of such a project would depend of course on the particular individuals creating it, and on their particular interests, competencies, and circumstances. But here we offer a few ideas about what such a project should or could do.

The EEP could work with funding sources and other agencies to help direct economic and institutional rewards toward educational programs with the characteristics suggested in section III.

It could create a consulting network of faculty, administrators, and/or OD specialists with experience and success in creating interdisciplinary, problem-centered, futures-oriented, etc.

courses and programs. This would not only help to make curriculum/institutional development resources more widely available, but would also provide professional and economic incentives for innovation of this kind.

A major focus of the EEP's activity should be the development of research and teaching for a general real-world problem-solving discipline; what might be called "planetary management." Thus the EEP would be responsive to the immediate need of government and business for trained personnel who are competent in dealing with the complex problems of growth and equilibrium. The development of curricula and methodologies for "executive seminars" and in-service training programs for government and business management would be a major goal of this activity.

In general, the focus of the EEP's activities should be neither exclusively on theory nor exclusively on practice, but rather should emphasize a close feedback between both theory and practice.[95]

The EEP could be based within a single higher education institution, or within a research institution concerned with higher education[96] or it could be a joint project of either an ad hoc or an established consortium of higher education institutions.[97] It could even be a project of an entire state higher education system[98] or a regional higher education agency[99] or of an international organization or agency concerned with higher education.[100] More important than the EEP's institutional base is that it be located in a center where intellectual and other resources are plentiful and accessible.[101]

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[95] See: Argyris and Schon. Op. cit.

[96] E.g., the Stanford Research Institute.

[97] An example of a project sponsored by an ad hoc consortium would be the Joint Center for Urban Studies of Harvard and MIT. Many formal consortiums of institutions exist: e.g., the Central Pennsylvania Consortium, the College Center of the Finger Lakes, etc.

[98] E.g., the California State University and Colleges, the Oregon State Higher Education System, the State University of New York, etc.

[99] E.g., WICHE, NEBHE, etc.

The scope of the EEP's interest and involvement should definitely be international. The problems with which it must be concerned cannot be dealt with adequately on a purely national, much less regional or state, basis. It is conceivable that the EEP could eventually form the nucleus for some kind of center for the new United Nations University.

Initially the size of the Ecological Education Project need not be very great. A staff of four or five would be adequate to start. Even supporting one or two people for a year or two to get the project off the ground would be a worthwhile investment, although continuity of effort is of critical importance and an assured existence of five years or more is essential to the project's success.

RBF probably will not have sufficient funds to fully support this project unilaterally over its needed lifetime. But the Fund could support the planning and development of the project and make a commitment to substantial, long-term support of such a project on a matching-funds basis. We believe that if RBF were willing to make a strong commitment to this kind of project, there are other organizations and agencies that would be interested in participating and providing support.

V.C. Forrester Institutions

Jay Forrester has recommended the establishment of two new institutions. One would be an institution for basic research on growth alternatives, equilibrium systems, growth policy, etc., bringing together in one place some of the world's "best minds" from business, government, religious institutions, the academic world, etc. for continuous study of the problems of growth and equilibrium over a period of some 15 years. The second institution would take the output of the first and use it as the basis of advising and educating legislators and other policy-makers.

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[100] E.g., the Institute for World Order, OECD, UNESCO, etc.

[101] E.g., Cambridge, MA, Berkeley, CA, etc.

In discussion, Chris Argyris expressed agreement with the idea, but argued that the two institutions should be combined into one. Also, said Argyris, the institution should not limit itself to producing reports and books, but should be directly engaged in the development and implementation of curricula for what we have called "planetary management." So the second part of Forrester's institution should function much like the Ecological Education Project which we recommended above; in fact there is no reason why the EEP could not become part of the Forrester institution.

Such an institution is, we believe, critically needed. It is, of course, a project whose scope goes beyond what RBF could support unilaterally. But RBF could provide support for the planning and development of such an institution.

V.D. Transformer Institute.

A third institution which needs to be created is an institute for the training of "transformers."[102] The Transformer Institute would provide graduate and continuing education for government, business, and other institutional managers. The training provided would generally have the characteristics of an adequate ecological education suggested in section III, but would focus heavily on the cultivation of the skills of effective "planetary management."

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[102] See section II.B.

At least one of the two projects mentioned above would have to be pre- or co-requisite to this one. The constraint here is that most of the content and method for an education in "planetary management" have not yet been created and it is these which the previous two projects are intended to provide.

Again, RBF could not support the creation of such an institution unilaterally, but the Fund could provide the "seed money" to help get such an institution started.

V.E. TV Series on Growth Alternatives

Another project with widespread and meaningful impact which RBF might wish to support is a TV series on growth alternatives. Such a series would examine in depth the various aspects of the ecological crisis, the "limits to growth" and the "growth debate," the extent and the limitations of our knowledge about the problems of growth and equilibrium, the process of growth policy-making, and would explore extensively and imaginatively the possibilities for "growth alternatives." Such a series would first of all promote awareness of and interest in the concept of growth alternatives. Secondly, it could lead to broader participation in the processes of designing growth alternatives and of creating growth policy. Also, it might significantly increase public demand for an adequate ecological education.

The series could be timed for airing in 1976. The Center for Growth Alternatives, the Critical Choices Commission, the Ford Energy Project, and the Forrester economic model project are just a few potential sources of input for such a program. Supplementary curriculum materials could also be developed to make the series maximally useful to teachers in schools and colleges. The materials could also be presented as a college course for credit through newspapers.[103]

The total cost of this project would exceed RBF's capabilities. The Fund could provide, however, support for the development of the concept, for the development of the necessary funding, and for the development of the production design.

V.F. Postsecondary Education Dynamics

As noted in section I.C, and throughout this report, the postsecondary education system (in the U.S. at least) has suddenly reached its own "limits to growth" after a generation of explosive expansion, and is now in a state of crisis as it grapples with making the transition to a "steady state." The crisis atmosphere results directly from our ignorance of what the dynamics of change in the postsecondary education system are likely to be over the next several years. A policy-oriented System Dynamics analysis of the complex system of postsecondary education[104] would be extremely helpful to educational leaders in gauging the total system response to alternative policies over the next two to three decades.

Unless postsecondary educational planning is more closely linked to broad economic and political planning, as can be done through a System Dynamics model, it will fail to be responsive in the future to changing physical and social system conditions. Policies recognizing the interaction between state, regional, and federal education agencies on the one hand, and various governmental and business planning agencies on the other, must be developed.

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[103] See: Caleb A. Lewis. "Courses by Newspaper." In Dyckman W.Vermilye (ed.). Lifelong Learners--A New Clientele for Higher Education. San Francisco: Jossey-Bass, 1974.

[104] Including such variables as rate of student enrollment, capital investment in higher education, demographic characteristics of the student population, educational resource de- (continued)

Such a System Dynamics study would not only be valuable to the higher education community itself, but would also be valuable to those of us who want to promote meaningful change and innovation in the postsecondary education system. As we suggested in section I.C., to the extent that the kinds of change and innovation required for an adequate ecological education can be demonstrated to be either essential to, or at least compatible with, the successful resolution of the current crisis in higher education, the prospects for such change and innovation actually taking place will be significantly enhanced.

The project suggested here would be a 2- to 4-year undertaking. At minimum, it would require the full-time effort of only one to three people, if these were attached to an established center for System Dynamics research. The total cost should be well within RBF's budgetary constraints.

V.G. Community Systems Laboratories.

In our Working Paper,[105] we recommended the establishment of "community systems laboratories" where students, teachers, scholars, managers, public officials, and other citizens would come together for the purpose of experimenting with and experiencing alternative kinds of communities to satisfy human needs and aspirations while remaining viable organisms within the constraints of the global ecosystem. In an interview, Duane Elgin reported that he has been working on a similar idea.

The implications of the Energy Crisis, the Food Crisis, and the other aspects of the ecological crisis are clear. Radically new designs for human settlements are needed in the very near, if not immediate, future. We must experiment on a

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104. (continued)
mands, alternative/competitive institutional structures, and many others.

large scale with the design of alternative human community systems. This need is now almost totally unmet. The kind of project required is of such a scale that it would not only be beyond RBF's means, it would probably be beyond the means of private foundations generally. The resources of business and government must be marshalled for the broad experimentation in community system design needed. RBF could provide support though for initial development of the concept and for subsequent promotion of the idea to those who can provide the kind of resources necessary for its realization. The total investment required for these preliminary activities would be well within the Fund's means.[106]

V.H. National LTG/HE Conference.

Finally, a modest project more limited in scope than anything mentioned above, which would be a useful and logical follow-up to the current project, would be a national conference on "The Limits To Growth and Higher Education." While RBF does not generally support conferences, we think that this could be a useful way to promote more widespread interest in the problems this project has addressed, and also, hopefully, to promote more widespread support for the future projects recommended here.

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105. Working Paper, p. 81.

106. This kind of project would seem to be a logical continuation of the Fund's prior activities in the area of land use and community development.

SUMMARY

I. The Problem

The analysis and recommendations of the report are based on six basic assumptions. These are: (1) that we are confronted by an unprecedented global "crisis of crises" involving all interrelationships among individuals, society, and the physical environment; (2) that responses of conventional institutions to the global crisis are characterized by too narrow a definition of the problem, diffuse and uncoordinated activity, and over-reliance on technological solutions -- "disjointed incrementalism"; (3) that the nature of the crisis demands a central and fundamental shift, not only in public behavior, but also in private attitudes and assumptions about man and his relationship to the rest of the world; (4) that such a shift will constitute a transformation from a world of built-in disequilibrium to a state of equilibrium; (5) that many different futures are possible, and no "best" concept or scenario exists; and (6) that education will play a vital role in the transformation process.

Working from these assumptions, we defined the task of the project as: to identify for the Rockefeller Brothers Fund how it may best invest its resources in postsecondary education to facilitate transformation to an equilibrium state. As the work of the project developed, we found that the issue of "limits to growth and higher education" had two facets: (1) what role can the postsecondary education system play in developing or implementing models of alternative futures and solutions to the present crisis; and (2) how can postsecondary education solve or even approach its own "limits to growth" of rising costs and dropping enrollments and revenues? We found that the two sides of the question reinforced each other and contributed to institutional readiness to address growth issues in a serious way.

In order to recommend funding strategies to RBF, we identified six key ingredients of "leverage" on the post-secondary education system. These are: (1) interest; (2) understanding of the nature of the problem confronted; (3) identification or development of curricula appropriate to the problem and to educational goals (see below); (4) models of educational settings which reflect curricular goals and methods; (5) expertise in organizational development to facilitate necessary change and innovations; and (6) incentive systems that reward appropriate curriculum development and institutional change.

II. Goals.

We recommended that RBF pursue four general goals. First, projects supported should strive to move "beyond limits" -- that is, should concentrate on conceptualizing, planning, or training for feasible and attractive future stable states, rather than continue to debate the adequacy of the analysis presented in Limits to Growth. A second and related recommendation is that the future projects should focus on developing competency in solving urgent growth problems rather than on alerting the public to the apocalyptic dangers facing us. Third, we recommend development of a new image of the "educated person." Such a new image would incorporate new standards of competence, new concepts of humankind's relationships with its social and physical environment, new definitions of responsibility and maturity. The new image of man would parallel what we called in our Working Paper "transformers" -- those who could lead society through the transformation to an equilibrium state. And fourth, the staff recommend development of an adequate "Ecological Education" which will train and produce transformers.

The report also recommends three broad research goals: (1) to learn all we can about the causes and consequences of growth, growth alternatives, equilibrium systems, etc; (2) to refine and extend our understanding of the processes of social and institutional change; and (3) to extend our knowledge of the nature of consciousness and to define the limits of human potential for growth, change, and adaptation.

In meeting the broad goals recommended, RBF should consider where in the educational system its potential for leverage is best applied, and what general strategy future projects should employ. We strongly recommend that funds be concentrated in the postsecondary sector, including non-collegiate postsecondary education institutions and nontraditional learning programs. Both "top-down" (identifying and working with those in positions of power) and "bottom-up" (developing grass roots movements) strategies deserve consideration.

III. An Adequate Ecological Education.

Curriculum for adequate ecological education should have these characteristics: it should be multi-level (that is, should cultivate not only ordinary learning, but also "Learning to Learn", expansion of consciousness, and trans-paradigmatic process); it must be interdisciplinary, problem-centered, futures-oriented, global, and humanistic. Although present curricula often exhibit a few of these characteristics, we believe that all are required for an adequate ecological education. We take no position on the precise content of curriculum, but emphasize that components of ecological curricula must be put together in a coordinated and conceptually coherent way.

The report also identifies five important components of the process of an adequate ecological education. First, it should display practical utility at both the micro and macro levels; it must help the individual to deal with critical personal problems, and the society to solve critical collective problems. Second, the process must be fun; it must engage enthusiastic participation on its merits rather than attempt to sensitize through doomsday attitudes. Third, an adequate ecological education will emphasize experimental exploration of the many alternatives for the future in economics, technology, and political and social structures. Fourth, ecological education should be characterized by harmony between curriculum content and the physical and social settings. Finally, ecological education should be experiential, including "real-world" learning experiences like internships and apprenticeships and social and personal learning experiences.

IV. Resources and Needs.

In analyzing the postsecondary education system in terms of the six ingredients of leverage identified in Section I, we found reason for cautious optimism. Interest in "beyond limits" research and education is generally high, as the higher education community faces its own "limits to growth" and a matching concern for growth issues in the larger society. The work of the project uncovered a good many people and educational programs displaying partial or initial understanding of the problem and some who have a good grasp of the problem--though no one has yet been able to implement a broadly ecological program on the basis of that understanding. As noted in Section III above, components of an effective curriculum, in materials, techniques, and skilled instructors are now in use. These require evaluation, revision, and integration into a comprehensive and coherent prototype. Some institutions providing a model for integration of setting and curriculum were found, though investigation turned up fewer truly "innovative" institutions than had been hoped. In the area of organizational development resources, we found some cause for concern. Although management and O.D. expertise has been developed, it is not as widely employed as would be desirable. Since many of the changes recommended here will require major, perhaps unprecedented, institutional shifts, the supply of "know-how" and personnel must be expanded dramatically. Incentives for change, in the form of employer demand for new competencies, already exist and specific recommendations for new incentive systems are presented below. Although all the ingredients of leverage are present somewhere in the postsecondary education system, there are no discrete leverage points where all or most ingredients come together; coordination and integration are once again required.

We recommend incentives to encourage development and adoption of new programs for students, faculty, and administrators. We feel that students will be attracted to programs that are demonstrably relevant to real-world problems, that provide an opportunity for meaningful work as part of the program and for employment upon graduation, that offer financial aid and that enjoy high academic reputation. Faculty will be more apt to support and work in new programs if they are offered opportunities for profitable or prestigious consultation or other extramural work, for scholarly publication in respected journals, for access to research funds and direct financial program support. Programs which are demonstrably cost-effective, which contribute to institutional prestige, and which enjoy the support of faculty and students will attract the endorsement of administrators.

During the course of the project, we identified several constraints working against the development of an adequate ecological education. These are: (1) inadequate supply of trained personnel; (2) the short time available to implement educational solutions to the global crisis and the professional time pressure faced by the few human resources in the field; (3) shortage of money available for curriculum development in ecological education; and (4) our ignorance of the required or desirable content, as opposed to process, of equilibrium education. In a survey conducted as part of the project, professionals in the field indicated that their primary needs were for money, trained personnel, direct communication (through conferences and networks) with others working on similar problems, and public recognition and support.

The project uncovered two important qualitative needs for change. First is to develop a "language" or structure to facilitate communication across disciplinary, cultural and paradigmatic boundaries. The second is to develop positive and powerful images of growth alternatives. The curriculum should include playful elements and the model of the future that the curriculum is designed to serve should be patently attractive. rather than a product of grim necessity.

To meet these needs, as well as the general needs for integration and coordinated development noted above in regard to curriculum and leverage, we see the most pressing need as meta-institutional. A meta-institution is one which spans boundaries, connects individuals and institutions, manages communication and coordinates research development, prevents inefficient dissipation of time and resources, and provides for the development of a critical mass of people and information to press for necessary change.

V. Projects.

We recommend seven projects which would move toward meeting the educational goals of developing competency for "transformers" and overcoming the constraints posed by dispersal of resources and uncoordinated activities.

The major recommendation is for an Ecological Education Project (EEP), a meta-institution of the kind described in Section IV. Another project, based on a suggestion of Jay Forrester, is for a two-part institution--one conducting basic research on growth-related problems and recommending action strategies to government. A third project is the development of an institution for training transformers. Fourth, we recommend the development of a television series on growth alternatives. The fifth recommendation is for a policy-oriented System Dynamics study of postsecondary education to serve as a basis for decision making. Sixth, we recommend establishment of "community systems laboratories," to explore and experiment with alternate community social, cultural, economic and political structures. Finally, we recommend a national conference on Limits to Growth and Higher Education, to explore the two sides of the growth question in higher education and to promote understanding of the problem in the higher education community as a whole.

Appendix A

ACKNOWLEDGEMENTS

Whatever success this project may have achieved would have been impossible without the help and support of many people.

Nancy Barber, Staff Associate of the Regional Services Unit of the WICHE General Regional Programs Division, provided invaluable assistance throughout the project. But for Nancy's editorial services, administrative help, intellectual input and moral support, our task would have been far more difficult.

Doug Sacarto served as Administrative and Research Assistant for the project. In addition to answering phones, making travel arrangments, filling out vouchers, watching over the budget, typing, filing, xeroxing, collecting research materials, writing correspondence, and several other menial but crucial tasks, Doug made useful input to our early brainstorming sessions, participated in the design of our survey, and took major responsibility for the creation of the Resource Directory. The value of Doug's services was grossly disproportionate to the meager remuneration we were able to give him. Without Doug's earnest, cheerful, and always reliable assistance, the successful completion of this project would have been impossible.

We must also express our gratitude for the voluntary contributions of Howard Leibowitz and Jill St. Denis. Jill and Howard both provided valuable inputs to our early brainstorming sessions. Serving without pay, Howard provided much valuable help, doing library research, writing correspondence, making contacts, conducting some preliminary interviews, and assisting in the analysis of the survey data and the assembly of the Resource Directory.

Flora Bovis, Teresa Vandello, and Yvonne Scott served our needs for typing with prodigious speed and efficiency. Flora also provided some extra administrative and secretarial assistance at times of need, as did Lorraine Eyl and Lucia Aylesworth. We are also indebted to Dean Gray of the WICHE Supply Office for his kind assistance with office logistics.

JoAn Segal, WICHE's head librarian, not only helped us in our research by responding brilliantly to our every need for information, but she also took the initiative in directing our attention to valuable resources whose existence would otherwise have been totally unkown to us. JoAn's contribution has been truly "invaluable."

Dr. John Cohen, former Planning Coordinator for WICHE and now Assistant Professor of Rural Sociology at Cornell University was extremely helpful to us, both before and after his departure from WICHE. John helped us in the initial planning of this project, and has since continued to bring information and other resources to our attention that have contributed to the project's goals.

Dr. Kevin Bunnell, Director of the Division of General Regional Programs at WICHE, was a prime mover behind this project. Throughout the project, Kevin has provided useful but gentle administrative guidance and consultation. Kevin also joined us for the two-week System Dynamics Institute at Dartmouth, and his participation there significantly enhanced the value for us of that experience.

Dr. Gerald Barney, Program Associate in charge of the Environmental Program of the Rockefeller Brothers Fund, not only was primarily responsible for the funding of this project, but made a contribution to this effort which went far beyond the bounds of a foundation executive's normal role. Jerry's many intellectual inputs have been consistently cogent and provocative. He gave us extensive advice and help in the management of the project which was always patient and understanding, and which helped us to avoid many pitfalls. Most important, Jerry provided moral support at times when it was really needed.

We are indebted to Dr. Dennis Meadows and Dr. Donella Meadows for inviting us to the Advanced Study Institute in Social System Dynamics which they conducted at Dartmouth College in August and September. Dennis and Dana also continually provided invaluable guidance and support throughout the planning and execution of this project.

We are also grateful to Dr. Dennis Pirages for inviting Dr. Perelman to his Conference on the Limits to Non-growth, held at the University of California campus at San Diego.

Bob Jorgenson at the University of California at Santa Cruz, Rev. Dave Steffenson at the University of Wisconsin at Green Bay, and Ed Kaelber, President of the College of the Atlantic, arranged busy and productive schedules for Dr. Perelman's visits to their institutions and provided great hospitality. We are most grateful to them for their consideration and help.

We wish to express our appreciation to Dr. Roy Lieuallen, Chancellor of the Oregon State Higher Education System, for arranging Dr. Perelman's meeting with Governor Tom McCall.

Finally, we are very grateful for the generous contributions of those who gave us their time and attention for interviews, who provided us with feedback on our working paper, and who took the trouble to respond to our questionnaires.

Appendix B

Project to Study the Implications of Growth Policy for Postsecondary Education

PROGRAM STATEMENT

Problem

In the past few years, widespread concern about the problems posed by the growth of human population, resource consumption, waste generation, and other forms of material economic activity, has increased dramatically. Throughout the world, and at all levels of society, there is now an urgent and increasing interest in the quantity and the quality of growth.

In the United States, at the grass roots level, there has emerged what the Task Force on Land Use and Urban Growth, sponsored by the Rockefeller Brothers Fund, dubbed a "new mood", characterized not only by open questioning of the goals of endless material growth, but also by overt, organized, and forceful citizen action to slow if not totally halt further economic "development" and population growth in an increasing number of communities and states. At all levels of government, there is increasing recognition of the need for comprehensive, long-term growth policy, embracing such areas as population, community development, racial/ethnic integration, housing, land use, transportation, environmental protection , energy production, resource exploitation, employment, etc. Local governments are more and more trying to control the rate and kind of growth occurring in their jurisdictions. A number of state governments are now engaged in the development of comprehensive, long-term growth policies, and nearly all states are now adopting policies dealing with specific aspects of state growth such as land use or environmental protection. At the national level, there have been at least ten major task force or commission reports over the last seven years concerned with national growth policy. A variety of legislation has been introduced dealing with specific aspects of growth policy, and two bills are pending in the U.S. Senate which would create formal governmental mechanisms to develop and implement a comprehensive, long-term national growth policy.

Internationally, many countries are now moving toward wide-ranging growth policies. The United Nations sponsored an international conference on the environment in Stockholm in 1972, and this summer will conduct a similar conference on population in Bucharest. A large number of international governmental and nongovernmental organizations are actively concerned with such areas of growth policy as trade, development, population, food, environmental protection, etc.

Pacing this rising concern for growth policy has been a growing recognition that our collective knowledge about the causes and consequences of growth, and about how to achieve more balanced and stable alternatives to established patterns of material growth, is actually quite limited. In response to this lack of knowledge and understanding, scholarly investigation into the causes and consequences of growth and growth alternatives -- studies largely neglected since the time of the classical economists of the last century -- have now resumed in earnest. Within this area of scholarly activity, there has evolved an intellectual movement around such names as Forrester, Meadows, Mishan, Daly, Ehrlich, Hardin, and others. This movement has seriously challenged the conventional wisdom about the desirability, the probability, and even the possibility of continued exponential growth in a finite world.

Of the several outstanding scholars participating in this intellectual movement, it is perhaps Professor Jay Forrestor of MIT whose work has had the most critical implications for growth policy. In his studies of the behavior of industrial and urban systems, using the System Dynamics methodology which he had developed over a period of some 20 years, Forrester showed that the causes and consequences of growth and of decline in such highly complex, dynamic systems were poorly understood by those who had responsibility for managing such systems. Hence, Forrester demonstrated, policies which were conventionally proposed to solve various problems associated with the growth of such systems predominantly tended to produce results which were either unproductive or even counterproductive.

In a book entitled World Dynamics, Forrester used the same kind of analysis to demonstrate graphically the inherent instability of the existing world economic/ecological system. Elaborating on Forrester's World Dynamics model, the Club of Rome's Project on the Predicament of

Mankind published its report, entitled The Limits to Growth, in the spring of 1972. This report, produced by a team of systems scientists and engineers under the direction of Dr. Dennis Meadows, bore out the central conclusion of Forrester's World Dynamics study: that not only do limits exist theoretically for world population and material forms of economic growth -- as Malthus, Ricardo, Mill, and others have argued since more than a century ago -- but that these limits are, in fact, on the verge of being reached. Indeed, the work of both Forrester and Meadows indicated that inadequate feedback and control mechanisms in the world system were likely to lead to an overshoot and subsequent catastrophic collapse of world population and industrial capacity. As often emerges in such System Dynamics analyses, these studies indicated that conventional, ad hoc policies designed to stave off disaster would not be likely to produce stability, and could actually make matters worse. On the contrary, what was clearly needed to achieve a stable equilibrium state in the world system was a coherent and comprehensive set of long-term growth policies, designed with an adequate understanding of the complexity and dynamic behavior of such a system.

As a result of the work of Forrester, Meadows, Herman Daly, and the several other leading scholars who have been concerned with the "limits to growth," there has been generated a considerable amount of controversy and debate about the nature of such limits and their impact on the behavior of real-world systems. Yet even while the debate about "limits" goes on, there has now emerged a school of thought which in some sense has gone "beyond limits." The members of this emergent school are less concerned with the basic question of whether there are limits to growth than they are with developing detailed and viable alternatives to conventional patterns of growth (that is, with developing models of potential equilibrium systems), and effective means for making those alternatives realizable.

There is a feeling generally held by members of the "beyond limits" school -- and widely shared by other constituencies as well -- that education has a crucial role to play in the resolution of the problems and issues related to growth policy. As the work of Forrester suggests, and as the general failure of conventional approaches to growth problems clearly demonstrates, the development and implementation of effective growth policy requires not only an attitude of concern, but also requires a far greater degree of competency in understanding and dealing with the behavior of complex social and ecological systems than the world's leaders and institutions now have. Clearly the cultivation of such competency is the responsibility of, and hence is a task of paramount importance for, our educational system. Some work has been done at the conceptual level on redefining the purposes and processes of education to respond to the needs of growth policy. Specifically, in a forthcoming book, Dr. Lewis Perelman discusses the implications of the transition to an equilibrium state for education. There have also been a considerable number of *ad hoc* efforts to develop educational programs to meet these needs; e.g., a variety of courses and programs in schools and universities in the areas of environmental education, population education, urban studies, futuristics, etc. Yet there have so far been no detailed and comprehensive plans developed to clearly define, create, and disseminate the kinds of educational innovations which the "beyond limits" school appears to be seeking. This, then, is the general problem to which this proposal is responding.

Objectives

The project proposed here will pursue four major objectives: (1) to define more clearly the goals which effective growth policy implies for postsecondary education; (2) to operationalize these goals; (3) to identify and assess existing resources that are applicable to these goals; and (4) to develop a strategy or strategies for the achievement of these goals.

APPENDIX C

EXCERPT FROM MEMORANDUM

To: RBF Files September 16, 1974

From: Gerald O. Barney

Subject: Western Interstate Commission for Higher Education (WICHE) - Second Meeting Monitoring Growth Debate in Education Study

The second meeting monitoring the progress of the WICHE study was held on September 9. Present were William Bergquist, Lewis Perelman, GOB, Elizabeth McCormack, and Judy Brown.

The meeting moved to a discussion of several questions of concern to LP and WB. First, what will the RBF do with the results of the WICHE study? In response, GOB briefly summarized the Fund's development over the past several years.

A late 1970 review of its programs made clear that profound changes were in order for the Fund to reflect the realities of dealing with the future. RBF staff realized that rethinking the future of its grantmaking activities must incorporate the theories of people like Vickers, Harman and Forrester and the use of system dynamics and Limits to Growth concepts. In line with this new thinking the Fund decided to support Forrester's economic modeling, which produced significant trustee reaction but was the beginning of the task of reorganizing the foundation to reflect new values and new views of the world.

As this reorganization has continued, the role of education and institutional development in dealing with the future has become increasingly clear. With its limited resources the Fund must identify the most likely sources for meaningful change within the educational system and make every effort to use these "centers of interest" or "soft spots" as "leverage" points for our limited funds. Perhaps one of the worst mistakes that can be made in curriculum development is to develop material for which there is inadequate interest and then go out and try to sell it. Another serious mistake is to develop some red-hot material that the system is not ready to accept; in this case it has to be smuggled in in a very unsatisfactory manner. The WICHE study is an effort to find "soft spots" within the system of higher education -- places with both the interest and the institutional readiness; the results will guide staff into more effective grantmaking in the future. Accordingly, what is required of the study is information about where significant change might occur (given the realities of the educational system, these probably will be few in number) as well as where some widespread interest occurs for future development and acceptance of change in the system. Since interest in this area is very limited among foundations in general, and curriculum development tends to be very money intensive, it is espcially important for the Fund to select very carefully the areas of education it will support.

The question of how best to formulate the study findings into a useful tool for the RBF was raised next. GOB asked the WICHE people to keep in mind the necessity to work within the Fund's own institutional framework and its limited financial resources. They indicated a tentative plan to submit their findings in four parts: 1) a brief summary report of their results and strategy recommendations on "leverage" points; 2) the resource directory listing the institutional, individual and material resources already available; 3) a supplement to the summary report presenting ideas obtained from the interviews in greater detail; and 4) a conceptual paper -- a form of the present working paper presenting the WICHE staff's premises and prejudices in viewing the future and their ideas for alternative solutions. GOB warned that this may be more material than the staff can adequately digest and suggested that WICHE keep their work as terse and incisive as possible.

The next subject raised was what questions staff wanted included in the interviewing segment of the study. GOB advised against using a standard set of questions and recommended a supportive technique geared to determine what each person is doing and what is being done elsewhere that would be of interest. Hopefully, in this way, both individual interest and institutional readiness will surface. The degree of detail sought in these interviews should be determined by the WICHE staff, keeping in mind RBF's limited resources. EM observed, in this connection, that there will be many who speak the language and express great interest but very few who can take a leadership position and act.

The discussion then turned to change itself and where best to institute it. The alternatives, as WICHE sees it, are to institute small innovations in large institutions where the impact is strongest or large ones in small institutions with a narrower impact but more flexibility. WB concluded after preliminary investigation that inter-institutional changes hold the greatest potential, i.e., using small institutions as guinea pigs for innovations which can, if successful, be adopted by the large, heavy impact institutions.

GOB reitereated that the RBF's primary interest is in determining the best ways to communicate the ideas of a few to a much larger group -- the objective is to further the growth debate with limited resources. Institutional change and new institutions sound expensive.

A brief discussion of curriculum then ensued. Curriculum changes as a means of furthering the growth debate must include the content of what is taught as well as the process of instruction and must bring together information from many disciplines, including systems techniques, energy flow, economics, sociology and others,in order to provide the necessary tools for examining and evaluating the growth question and developing alternative solutions.

Appendix D

PROCESS AND PRODUCTS OF THE PROJECT

I. Staff

Project Director:	Lewis J. Perelman, Ed.D.
Project Co-Director:	William H. Bergquist, Ph.D
Research and Administrative Assistant:	Douglas Sacarto
Staff Associate, WICHE Regional Services:	Nancy Barber
Volunteer Research Assistants:	Howard Leibowitz Jill St. Denis

II. Process

As the result of an initiative by Dr. Kevin Bunnell, Director of the Division of General Regional Programs, and Dr. William Bergquist, then Director of the Office of Special Higher Education Programs, Dr. Lewis Perelman was hired in April 1974 as a consultant to the Western Interstate Commission for Higher Education (WICHE) to help "develop the concepts of Limits to Growth for Western postsecondary education." One result of Dr. Perelman's activity was the submission of a proposal to the Rockefeller Brothers Fund for a "Project to Study the Implications of Growth Policy for Postsecondary Education." A grant for this project was awarded to WICHE by the Fund inthe summer of 1974. The project began in the first week of August 1974 and was scheduled for completion by the first week of December 1974.

Because this project was to a large extent a continuation of research and other activities performed during the preceding several months at WICHE. the first step we took in the process of the project was a two week "think tank" whose purpose was to set down, in outline form, our initial knowledge, beliefs, and expectations about the implications of "limits to growth" for the future of postsecondary education. The major participants in the "think tank" were Perelman, Bergquist, Sacarto, Leibowitz, and St. Denis. The process involved long hours of discussion, debate, and "brainstorming."

After the "think tank," Perelman and Bergquist wrote a Working Paper, based on the outline that had been developed. Our initial intention was that the Working Paper would be a first draft of what would be a major product of the project. We planned to circulate the Working Paper widely among colleagues for comment and criticism, and then to create a revised final version which would become a major document of the project. We eventually changed this plan, partly because it became clear after our first meeting with the RBF staff that this kind of document would not be adequately responsive to the Fund's goals for the project, and partly because we realized that there would not be enough time during this project to do an adequate job of further research and revision. We did circulate copies of the Working Paper to about sixty people. We have received comments from several of these, and expect to continue to receive comments after the project is completed. We contemplate one or more possible future publications based on the Working Paper. The editorial board of the Harvard Education Review expressed interest in publishing an article based on the paper, but there has not been enough time during the project to do the necessary revision. The paper is included as a supplementary document to our final report to the Fund, and parts of the paper are referred to in the report itself.

For two weeks in August and September 1974, Perelman, Bergquist, and Bunnell attended Dennis and Dana Meadows' Advanced Study Institute in Social System Dynamics at Dartmouth College. We had three major reasons for attending this institute. First, we wanted to learn more about the System Dynamics methodology which formed the basis for Forrester's Industrial Dynamics, Urban Dynamics, and World Dynamics, and Meadows' Limits to Growth, and which is also the basis for the Forrester studies of the national economy currently sponsored by RBF. Second, the institute brought together a powerful and diverse group of scientists, business and government planners, educators, foundation executives, etc., which we felt could provide some valuable inputs to our study. And third, we wanted to observe the institute as one kind of an educational process that would be relevant to the goals of our project. The institute served all of these ends, and more. In general, it was one of the most stimulating and productive experiences we had in this project.

We had two meetings with RBF staff in the course of this project. The first meeting was attended by Perelman with William Dietel, Gerald Barney, John Esty, and Judy Brown. The second was a meeting of Perelman and Bergquist with Gerald Barney, Elizabeth McCormack, and Judy Brown. These meetings were extremely helpful to us in clarifying the goals of the project and in making appropriate adjustments in the process.

A major part of the process of this project was a mailed survey to approximately 900 individuals in the U.S. and elsewhere. We put together the mailing list for this survey from a variety of sources, including personal contacts, readings, etc. The survey consisted of two questionnaires. Questionnaire 1 asked respondents to identify resources -- people, institutions, and materials -- in four general areas: Growth Policy, Growth Alternatives, Causes and Consequences of Growth, and Learning and Change. Questionnaire 2 asked several questions intended to educe detailed information about our respondents' own resources, activities, and needs. We received approximately 85 responses to the survey. Responses to Questionnaire 2 form the basis of the Resource Directory which accompanies this report; data from a question on "needs" are included in section IV of the report itself.

We interviewed about 40 people in regard to the subject of this project. These were people whom we felt had important experience or expertise relevant to the project's concerns. We also visited several educational institutions that were doing things that we felt were relevant to our project's goals. Our notes on these interviews and visits are collected in a supplementary document to this report. There were many more people to whom we would have liked to talk, and many other institutions we would have liked to visit, had we had more time and money.

Bergquist attended the annual meeting of the American Council on Education in San Diego to meet and talk with some of the leading figures in American higher education. At the same time, Perelman attended a conference on "The Limits to Non-Growth" conducted by Dennis Pirages at the University of California at San Diego, which was attended by many of the leading figures in the "beyond limits" school: e.g., Herman Daly, William Ophuls, John Holdren, John Platt, et al. The tight schedule of the Pirages conference did not permit scheduling of any formal interviews, but many papers were presented on various social, political, economic, etc. aspects of the "steady state" and there were a few informal get-togethers which provided some useful and interesting conversation.

Finally, we tried to do all the reading and library research we could. However, the demands of all these other activities made it extremely difficult for us to do as much of this as we wanted to. We generally accumulated printed material several times faster than we were able to digest it, and this was perhaps the most frustrating aspect of this whole project.

III. List of Institutions Visited.

Perelman visited the following institutions:

The Aspen Institute for Humanistic Studies
Aspen, CO

The College of the Atlantic
Bar Harbor, ME

The University of Wisconsin at Green Bay
Green Bay, WI

The University of California at Santa Cruz
Santa Cruz, CA

Bergquist visited the following institutions:

The Evergreen State College
Olympia, WA

The School of Education, University of Massachusetts
Amherst, MA

Department of Education, The Claremont Graduate School
Claremont, CA

IV. List of People Interviewed

Perelman interviewed the following individuals:

Chris Argyris
Professor
Harvard Graduate School of Education

Sir Geoffrey Vickers
Philosopher
Associated with the Division of Study and Research in Education
Massachusetts Institute of Technology

Jay Forrester
Professor
Sloan School of Management
Massachusetts Institute of Technology

Ed Kaelber
President
The College of the Atlantic

Sam Eliot
Vice President
The College of the Atlantic

Daniel Kane
Faculty Member
The College of the Atlantic

Dick Davis
Faculty Member
The College of the Atlantic

Enno Becker
Student
Organizer of the World Systems Workshop
The College of the Atlantic

Frank Potter
Counsel
Subcommittee on Fisheries and Wildlife Conservation and Environment
U.S. House of Representatives

Sydney Howe
Director
The Center for Growth Alternatives

Walter Bogan
Director
Office of Environmental Education
U.S. Dept. of Health, Education, and Welfare

Rowan Wakefield
    Director
    Center for Government/Education Relations
    Aspen Institute for Humanistic Studies

Arthur Barber
    President
    First Communications Company

Lincoln Gordon
    Director
    Woodrow Wilson International Center for Scholars
    The Smithsonian Institution

Everett Rogers
    Professor
    The University of Michigan

Donald Michael
    Professor
    The University of Michigan

Kan Chen
    Professor
    The University of Michigan

Ed Weidner
    Chancellor
    The University of Wisconsin at Green Bay

Halvor Kolshus
    Associate Dean
    The University of Wisconsin at Green Bay

Arthur Harkins
    Professor
    College of Education, The University of Minnesota

Margaret Hamilton
    Systems Analyst
    U.S.Geological Survey

Willis Harman
    Director
    Educational Policy Research Center
    Stanford Research Institute

Duane Elgin
    Research Associate
    Stanford Research Institute

Paul Niebank
Provost
College VIII
University of California at Santa Cruz

Stanley Cain
Professor
The University of California at Santa Cruz

Pat Sullivan
Assistant Chancellor for Planning and Analysis
The University of California at Santa Cruz

Gene Cota-Robles
Vice Chancellor for Academic Administration
The University of California at Santa Cruz

Harold Linstone
Chairman
Systems Science Department
Portland State University

Magoroh Maruyama
Professor
Portland State University

Tom McCall
Governor of Oregon

Roy Lieuallen
Chancellor
Oregon State Higher Education System

E. F. Schumacher
Director
Intermediate Technology Group

In addition to the above, Perelman had the opportunity for some informal conversations with some of those who attended the Pirages conference in San Diego; including the following:

Michael Washburn
Director
Institute for World Order

Ronald Ridker
Research Associate
Resources for the Future

Herman Daly
Professor
Louisiana State University

Edward Renshaw
Professor
State University of New York, Albany

John Platt
Professor
The University of Michigan

William Ophuls
Independent Writer and Lecturer
Stanford, California

Michael Kraft
Faculty Member
Vassar College

Victor Lippitt
Professor
The University of California at Riverside

Peter Stillman
Faculty Member
Vassar College

Bergquist interviewed the following individuals:

David Schimmel
Head of the Program on Global Survival
School ofEducation
The University of Massachusetts

Seymour Sarason
Professor
Yale University

John Vasconcellos
Assemblyman
California State Assembly

Donald Schon
Professor
Massachusetts Institute of Technology

Sister Joel Read
President
Alverno College

Dave Leveille
Associate Dean
California State University and Colleges

Tom Harvey
Professor
Claremont Graduate School

Glenn Dumke
Chancellor
California State University and Colleges

Anthony Moye
Dean
Academic Program and Resource Planning
California State University and Colleges

Glenn Terrell
President
Washington State University

Neil McBride
Assistant to the Dean
School of Education
University of Massachusetts

Gary Quehl
President
Council for the Advancement of Small Colleges

In addition to the above, Bergquist and Perelman both interviewed Gregory Bateson, currently a Professor at Kresge College, the University of California at Santa Cruz. During the System Dynamics Institute at Dartmouth, we had many interesting conversations; but we received especially useful input from the following:

James Bright
President
The Independent Management Center

Ernest Hartung
President
The University of Idaho

Donella Meadows
Professor
Dartmouth College

James Bell
Professor
Florida State University

V. Results of Survey.

In general, the most successful part of the survey (see p.3,App.D) was Questionnaire 2, which asked respondents to provide information about their own resources, activities, and needs. This information is presented in the Resource Directory. Questionnaire 1 was so cumbersome in design that very few (41) of our respondents took the trouble to fill it out and these generally completed it only in part. In fact, it probably discouraged some people who might otherwise have responded to the survey from replying at all. The only useful product from Questionnaire 1 was some additional names for our mailing list.

The problem in designing the survey was that we had so little staff, time and money that we knew we would not be able to effectively analyze the data from an easy-to-fill-out, open-ended kind of questionnaire. So we designed a highly-structured questionnaire which put most of the burden for information-processing on our respondents. Also, because we were surveying a diffuse and rather ill-defined field, it was probably unclear to many of our potential respondents how they could relate to our project's concerns.

All things considered, we were gratified by the rate of response to our survey and felt that the information we gained through it was worth the effort.

VI. Summary of Products.

The products of this project are as follows:

Growth and Education: A Strategic Report to the Rockefeller Brothers Fund on the Implications of Growth Policy for Postsecondary Education *

Supplementary Document #1: Resource Directory.*

Supplementary Document #2: Notes on Interviews and Institutions.

Supplementary Document #3: Working Paper.*

Supplementary Document #4: Bibliography.*

Supplementary Document #5: Mailing List.

* These documents are on file with ERIC. They are also available from WICHE.

Appendix E

SOME NOTES ON PARADIGMS

L. J. Perelman

A question of considerable interest to Gerald Barney of the RBF staff and to myself has concerned T. S. Kuhn's concept of the "paradigm shift" and its possible applicability to social change in general, and to the "growth debate" in particular. This is a complex and subtle issue which could not be dealt with directly in this project, but which came up in much of our conversation and reading. It is not possible to deal with this subject exhaustively here, but I would like to offer some thoughts both of my own and of others on this subject which may be of interest and some use.

In general, I would say that the concept of the "paradigm shift" has become a popular and pervasive metaphor for certain kinds of individual, institutional, and societal change processes. I base this observation on many of my discussions and readings connected with this project. Whether this widespread use of the Kuhnian "paradigm shift" as metaphor is, in fact, a valid analogy in all of the instances where it occurs is a matter of some debate and disagreement. My personal feeling is that the concept as metaphor has become so popular and so useful in the discourse on individual and social change that whether the analogy is technically valid or not is a matter of little consequence. I see no obvious reason why science historians should have patent rights on an idea that has such great utility in an arena far larger than that of their rather esoteric discipline.

In this appendix, I will present an excerpt from a memo I wrote in May 1974 where I used the Kuhnian "paradigm" concept in reference to the "growth debate." After that, I will present some comments and ideas of others on the use of this concept.

Perelman: The Growth Debate as Paradigm Conflict

Certain members of the WICHE staff, some members of the Commission itself, and of course myself, all shared a certain credence in the message of Limits, and a commitment to try to work for the kinds of changes that seem necessary to avoid some of the study's more dismal projections. Those of us who have advanced this project so far have therefore shared some basic values, including: (1) that population growth and many material or ecologically stressful forms of economic 'development' were neither inevitable, nor necessarily desirable, nor even necessarily possible; (2) that the future need not be passively experienced but can be consciously and actively created; (3) that necessary and sufficient creative action to secure a positive expectation of continued planetary survival, to maximize planetary welfare (not only of people but also in the broad, ecological sense), and hopefully to advance planetary development (in a sense more meaningful than purely material terms) was ethically at least, justified if not, in fact, required.

I can report with some authority that such values are neither ubiquitously, nor necessarily even widely, shared. Indeed, there are many who sincerely and conscientiously believe that: (1) population growth is a positive good (or conversely, that any planned attempt to reduce such growth is a positive evil); (2) that continued exponential growth of gross economic product--as conventionally defined and measured--is sufficient or even necessary to solve most or all of the world's most critical problems (or conversely, again, that any planned attempt to reduce such growth is a positive evil); (3) that the 'march of progress' is inexorable and that those questioning or opposed to it are "Luddites"; (4) that conscious intervention into the existing social dynamic is "social engineering", "fascism", "communism", something out of "1984", "Brave New World", etc.--e.g., that "planning" is a dirty word.

In short, this project and its goals are controversial. Moreover, this controversy or dialectic is not of the sort that can ultimately be resolved simply through rational debate of the nature or meaning of discrete facts. This controversy exists, I believe, on a higher plane, on the level of what the scientific historian Thomas Kuhn called a "paradigm shift". This is a subtle and complex, but crucial, notion.

Essentially what Kuhn postulated in his radically innovative thesis, The Structure of Scientific Revolutions,* was that, contrary to what

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* Kuhn, Thomas. The Structure of Scientific Revolutions. Chicago: The University of Chicago Press, 1970.

classical historians of science almost uniformly implied, the evolution of western scientific thought was not a gradual, continuous process of incremental accretion of knowledge. Rather, the evolution of western science was marked by two distinctive and recurring phases. One was "normal science", the practice of which Kuhn suggested was analogous to "puzzle-solving". Characteristics of this phase are: (1) that the definition of what problems are and their priority of importance are almost uniformly known and subscribed to by the practitioners of the science; (2) that the general heuristics, or 'rules of the game' of problem-solving are similarly uniformly known and subscribed to; (3) that there is a definite, underlying confidence among practitioners that the solutions to problems do, in fact, exist and hence that the normal practice of science lies in 'puzzling out' the actual solutions; (4) therefore, that the polemics of normal science center on the validity of data or of the actual carrying out of problem-solving procedures, but do not generally center on the definition of problems, the existence of solutions, the validity of the normal problem-solving procedures of the science themselves. In short, the *paradigm* of normal science is not intentionally challenged in the common practice of normal science.

However, said Kuhn, from time to time there arise *anomalies*; problems which do not yield to the conventional puzzle-solving practices of normal science; problems which seem to demand for their solution a radical transformation of the essential paradigm of normal science itself. If these anomalies are sufficiently stubborn, they give rise to the second distinct phase of western scientific evolution: a scientific revolution.

The essential characteristic of these occassional eras of scientific revolution is that a new paradigm or paradigms emerge to challenge the old; the ranks of the practitioners of normal science undergo a schism as there occurs a general choosing up of sides among competing paradigms. For the practitioners involved, this era of paradigm shift may be marked by considerable stress, anxiety, and bitter controversy. "Reality" itself seems to be -- and in fact is -- in doubt: "Things fall apart/ The center cannot hold." But the attribute of this phase of paradigm change which is perhaps most relevant to our concern here is that the dialectic that exists in this situation is not the sort that is resolvable simply through logical debate about facts and theories. As Kuhn explained:

> ...In a sense that I am unable to explicate further, the proponents of competing paradigms practice their trades in different worlds. One contains constrained bodies that fall slowly, the other pendulums that repeat their motions again and again. In one, solutions are compounds, in the other mixtures. One is embedded in a flat, the other in a curved, matrix of space. Practicing in different worlds, the two groups of scientists see different things when they look from the same point in the same direction. Again, that is not to say that they can see anything they please. Both are looking at the world, and what they look at has not changed. But in some areas they see different things, and they see them in different relations one to the other. That is why a law that cannot even be demonstrated to one group of scientists may occasionally seem intuitively obvious to another. Equally, it is why, before they can hope to communicate fully, one group or the other must experience the conversion that we have been calling a paradigm shift. Just because it is a transition between incommensurables, the transition between competing paradigms cannot be made a step at a time, forced by logic and neutral experience. Like the gestalt switch, it must occur all at once (though not necessarily in an instant) or not at all.*

In light of these considerations, Kuhn went on to try to analyse how, in fact, the scientific revolution was resolved; that is, how sides were actually chosen and how the ensuing dialectic was carried out to a conclusion. Kuhn's conclusion seems somewhat uncertain to me, but it contains one observation that impresses me as being profoundly relevant to the existing controversy surrounding Limits, and to the political (in the broad sense) problem which confronts us. Specifically Kuhn wrote:

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* IBID, p. 150

> But paradigm debates are not really about relative problem-solving ability, though for good reasons they are usually couched in those terms. Instead, the issue is which paradigm should in the future guide research on problems many of which neither competitor can yet claim to resolve completely. A decision between alternate ways of practicing science is called for, and in the circumstances that decision must be based less on past achievement than on future promise. The man who embraces a new paradigm at an early stage must often do so in defiance of the evidence provided by problem-solving. He must, that is, have faith that the new paradigm will succeed with the many large problems that confront it, knowing only that the older paradigm has failed with a few. A decision of that kind can only be made on faith.* (Emphasis mine.)

To illustrate this process of scientific revolution very briefly, some historical examples are: the rise of Copernican astronomy; the establishment of Newtonian mechanics; the subsequent overthrow of Newtonian mechanics and ascendency of modern quantum mechanics and relativity theory. These latter revolutions were all sparked by the existence of anomalies which the established paradigms of the then-normal sciences were unable to resolve or assimilate. Today, new anomalies have arisen which threaten to undermine the establishment of contemporary normal science: e.g., the discovery of the anomalous astrophysical phenomena of quasars and pulsars; the whole set of inexplicable but demonstrably real phenomena of parapsychology; etc.

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* IBID, pp. 157-58.

The question arises whether Kuhn's notion of paradigm shift can be justly applied outside of the so-called "natural sciences", Do similar revolutions occur in the "social sciences"? Even more germane to this discussion: do they occur in the more applied branches of social science -- what might be called the "helping/governing" sciences -- e.g.: government, public health, social work, management, education, etc.?

The fact is that some have suggested that the notion of paradigm shift is not properly applied to the social sciences. The reason given is fairly simple: in the social sciences, it is argued, paradigms are in a constant state of conflict and flux; since no one paradigm ever becomes sufficiently established to become "normal", no climactic "revolution" ever occurs. For some fields of social science, where there is considerable ideological fragmentation -- e.g., some areas of psychology, and perhaps economics -- this is probably true. But I am inclined to believe that this is not so much so in the area of what I have called above the helping/governing sciences. It seems to me that in this area a fairly concrete and nearly ubiquitous paradigm has been operating at least since the end of the Second World War, and also that this dominant paradigm is now being challenged by at least one newly-emerging paradigm. As evidence of this contention, I return to the characteristics of "normal science" described above and suggest what I perceive to be their analogies in "normal" h/g science.

First: "that the definition of what problems are and their priority of importance are almost uniformly known and subscribed to by the practitioners of the science." I would suggest that in the recent post-War era, most practitioners of normal h/g science were in substantial agreement about what were problems and what were important problems. Some generally-recognized-to-be-important problems: economic 'development'; cancer; crime; nuclear war between the U.S. and the U.S.S.R., or in fact, anything concerning relations between these two countries; national power, prestige, independence; landing a man on the moon; unemployment; drug addiction; Vietnam; individual mental health; educating children; pest control.

Second: "that the general heuristics, or 'rules of the game' of problem-solving are similarly generally known and subscribed to." This is a little harder to give specific examples of, but some of the tacit or overt assumptions of conventional h/g science problem-solving are: problems are attacked through "programs"; crises are attacked through "crash programs"; all problems can be solved by solving each problem; more money never hurts; doing something is better than doing nothing; failure can be attributed to individual incompetence, lack of effort, malice, or personality conflict; newer, more 'modern' methods, treatments, facilities, technologies are always better than older, more 'primitive' ones; 'experts' or 'specialists' have greater competency; experience increases competency; "they" should, can or will solve this problem; failure is bad; uncertainty is bad; we'll cross that bridge when we come to it; problems can be solved or at least alleviated by disseminating money, resources, information, services, etc. from a central distributor to a passive recipient population; problems arise from simple causes that are amenable to simple cures; solutions that work in the short term, on a small scale will work in the long term, on a large scale.

Third: "that there is a definite, underlying confidence among practitioners that the solutions to problems do, in fact, exist and hence that the normal practice of science lies in 'puzzling out' the actual solutions." Suffice it to say that this has clearly been true of the normal h/g science of the post-World War II era.

Fourth: "therefore, that the polemics of normal science center on the validity of data or of the actual carrying out of problem-solving procedures, but do not generally center on the definition of problems, the existence of solutions, the validity of the normal problem-solving procedures of the science themselves." Again, I assert that this has been generally characteristic of the normal practice of h/g science in the last thirty years or so, and has only begun to change significantly in the last few years, precisely because of the emergence of new, challenging paradigms. Some examples: there has been considerable debate over the years about how best to solve the problem of narcotics addiction, but recently some have begun to question whether narcotics addiction is really a serious problem at all, and in fact have suggested that the attempted solutions to this alleged problem have been far more pernicious than the problem itself; there has long been plenty of controversy over how schools could be made more effective, efficient, productive, but now a body of thought has emerged which perceives schooling not as a solution but as the problem itself; the long-standing arguments about how to build better prisons, mental hospitals, interstate highways, skyscrapers, supersonic transports, nuclear weapons, etc., have been undercut by the more basic questions posed by the proponents of newly-emerging paradigms about whether the solutions are not, in fact, the paramount problems.

I suggest, then, that the controversy surrounding *Limits* is of this sort. It is symptomatic of the emergence of a new paradigm challenging the basic paradigm of conventional h/g science. I believe that this new paradigm is emerging in a different way on all the fronts mentioned above as well as many others. I suspect that *Limits* may be of somewhat greater importance than any of the others because the issues it raises seem to be the most urgent, immediate, global, and radical in their implications.

Pirages and Ehrlich: The Dominant Social Paradigm

The following are some excerpts from *Ark II* by Dennis Pirages and Paul Ehrlich in which they discuss the concept of the "paradigm shift" in broad, social terms.

> The collection of norms, beliefs, values, habits, and so on that form the world view most commonly held within a culture and transmitted from generation to generation by social institutions may be called a dominant social paradigm (DSP). Paradigm is a useful shorthand term for describing the prominent world view, model, or frame of reference through which individuals or, collectively, a society, interpret the meaning of the external world. In other words, a DSP is a mental image of social reality that guides expectations in a society. A DSP is the socially relevant part of the total culture. Different societies have different DSPs. A social paradigm is important to society because it helps make sense of an otherwise incomprehensible universe and to make organized activity possible. It is an essential part of the cultural information that is passed from generation to generation as it guides the behavior and expectations of those born into it.

Despite many differences, citizens in most industrial countries share with Americans a belief in progress, faith in the steady increase of material affluence (which unfortunately is often equated with progress), and belief in the necessity and goodness of growth. Other central features of the industrial DSP seemingly include high values placed on work, the nuclear family, and career-oriented formal education; a strong faith in the efficacy of science and technology (as opposed to religion) to solve problems; and a view of Nature as something to be subdued by mankind.

No DSP can persist unaltered unless its content corresponds to or gives valid guidance for dealing with reality. Twenty years ago it would have been unusual for anyone in the United States to question the "fundamental truths" of what was then the orthodox view of the world, but today countless citizens are questioning many basic beliefs inherent in the present DSP, for these beliefs are no longer useful in successfully interpreting social reality. The system no longer seems to be working, and millions of Americans are uneasy, if not disillusioned.

It must be understood that deliberately changing fundamental assumptions and attitudes inherent in the industrial DSP means nothing less than designing a new culture. This would represent a revolutionary step that has rarely been attempted, although it would be akin to the cultural revolution that has recently shaken China. Designing a new culture means adopting an activist attitude toward cultural evolution rather than passive acquiescence to the results of technology; but most important of all, it means actively intervening to modify norms, values and institutions to bring them into line with the physical and biological constraints within which mankind must operate. The entire world society must soon reach a consensus on what is meant by a livable world and must cooperate in using science, technology, and social institutions to construct that world, rather than forcing human beings to conform to a world shaped by these forces out of control.

Cultures and DSPs that developed in hunting and gathering societies were destroyed by a new way of life introduced by the agricultural revolution. Similarly, the world view produced by the development of industrialism overwhelmed the previous cultures. In both instances a shift in outlook took place as old norms, values, and institutions were replaced by new ones reflecting new social conditions. In both, a "paradigm shift" was facilitated by obvious economic benefits received by, and higher survival rates among, those who moved to a new way of life. Today there are no obvious economic incentives to encourage acceptance of a new DSP. In fact, quite the opposite is true. Nevertheless, the inadequacy of the present paradigm to cope with new, simultaneously developing problems is becoming increasingly evident to people who are prepared to recognize it. But time is too short to await the evolution of an alternative viable paradigm. The main problem for industrial society in the last quarter of the twentieth century will be to design new and feasible alternatives and to move toward the best of them. Mankind must begin to turn this new awareness of planetary danger into meaningful social action.*

Dunn: Paradigm Shift as Social Reorganization.

The following quote from E. Dunn appears in Donald Michael's book, On Learning to Plan, and Planning to Learn. It seems worth repeating here:

> The principal problem of social organization that confronts advanced societies....can best be seen by con-

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* Pirages & Erlich. Ark II: Social Response to Environmental Imperatives. San Francisco: Freeman, 1974. pp.43,44,48

trasting the organizational consequences of normal problem solving and paradigm shifts. In normal problem solving, system reorganization is purposive, anticipatory, and controlled. In contrast, paradigm shifts have historically been primarily reactive, unanticipated, and uncontrolled. They tend to arise out of a reaction to exogenously and endogenously generated boundary crises. They are frequently unanticipated by the management elite of the system. The reorganization is often defensive in character -- that is, it is directed toward preserving and extending the life of the system in the face of change rather than taking the form of a directed self-transformation in pursuit of some higher order goal.

We appear to have arrived at a point in social history where this kind of uncontrolled social reorganization is taking on a rate and form that seem to threaten the viability of the social process itself. The reason for the special nature of the threat in advanced societies is the fact that we have formalized and mastered the process of normal problem solving in the physical sciences and in the design of physical systems to the point that this very process is generating an accelerated and escalating series of boundary crises for established social systems.*

Michael: Limitations of the Kuhnian Analogy.

In our conversation, Donald Michael expressed the view that Vickers' concept of "appreciation" is more appropriately applied to the phenomena of individual and social change than Kuhn's concept of the "paradigm." Expanding on this, Michael referred to the following excerpt from his book:

> Some believe that the weaknesses in the conventional view of humans, as demonstrated by the declining state of the society, and the attractiveness of the human potential view of human nature, as a myth around which to

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* Dunn, E. Economic and Social Development: A Process of Social Learning. Baltimore; Johns Hopkins, 1971. pp. 214-215.

> reconstruct social reality, together provide the thrust for a "paradigm shift," in T. Kuhn's phrase. There are indeed fascinating analogies between the conditions that lead to a fundamental change in the scientific definition of physical reality and the conditions in society today that appear to be encouraging a redefinition of social reality. But to my mind, the preconditions for the equivalent of a scientific paradigm shift do not really exist in the changing and ambiguous world of everyday society. For one thing, scientific paradigms are far more definitive than social paradigms. This makes the demonstrations of anomalies much more impressive and the need to deal with them more compelling.
>
> "Without the special apparatus that is constructed mainly for anticipated functions, the results that lead ultimately to novelty could not occur. And even when the apparatus exists, novelty ordinarily emerges only for the man who, knowing *with precision* what he should expect, is able to recognize that something has gone wrong. Anomaly appears only against the background provided by the paradigm. The more precise and far-reaching that paradigm is, the more sensitive an indicator it provides of anomaly and hence of an occasion for paradigm change" (Kuhn, 1970, p.65). What is valuable in the paradigm shift metaphor is the strong suggestion that a major shift in the dominant mode of appreciation (to use Vicker's term, which I prefer) may be underway, and that this will produce new questions about what humans can be and new answers to them. As a result, what are now political, economic, social "impossibilities" might become feasible.*

Michael also adds the following remark on the prospects for leading meaningful change:

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* Michael, Donald. *On Learning to Plan and Planning to Learn: The Social Psychology of Changing Toward Future-Responsive Societal Learning*. San Francisco: Jossey-Bass, 1973. pp. 288-89.

> But the fact is that we really don't understand the processes of change in this society, which is so complex that it has no historical precedent: that is why we must turn to [future-responsive societal learning]. We don't know what it takes to make a difference, to produce a change, in the definition of social reality that is akin to T. Kuhn's paradigm shift. We don't know how to measure or perceive clearly the dialectics of trend and counter-trend, value and counter-value, image and counter-image. *

Maruyama: Paradigms and Communication.

Magoroh Maruyama, Professor of Systems at Portland State University, has had a major and long-standing concern with the problems of paradigm change and cross-paradigmatic communication. He has defined this as a field of interest that he calls "Paradigmatology." One of Maruyama's major papers on this subject is "Paradigms and Communication." The following is the abstract of this article (which, by the way, contains many useful, additional references on this subject):

> Different structures of reasoning which exist in different cultures, professions, and disciplines are called different "logical models", "logics", "epistemologies", etc., depending on disciplines. For the sake of brevity they are called different "paradigms" in this paper. This paper proposes the exploration of paradigmatology and its application to cross-disciplinary, cross-professional, and cross-cultural communication. The paper consists of introductory sections and three main parts. The first main part discusses three paradigms, whose differences frequently cause frustration and frictions in interdisciplinary and inter-professional work, especially in urban planning, environmental design, etc.

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* Ibid, p. 303.

> The second part discusses existence of literature on the paradigmatic aspects of cross-cultural communication, and the theoretical and conceptual tools available for the identification and analysis of misunderstandings in cross-paradigmatic communication. It mentions paucity of literature on cross-disciplinary and cross-professional communication and on methods for improvement of cross-paradigmatic communication. Demonopolarization and transspection are proposed. Finally, transparadigmatic process as the process to create not-yet-existing paradigms is discussed. *

Comments on Paradigms.

Several of the individuals I interviewed made comments concerning paradigms or paradigm shifts in regard to the growth debate.

Frank Potter commented that we are currently in a state of shifting paradigms.

Walter Bogan said that he felt that many of his colleagues now recognize a need for a paradigm shift in the policy sciences.

Sir Geoffrey Vickers asserted that a "beyond limits" kind of paradigm shift has to be introduced at all levels of education.

Everett Rogers stated his belief that we are currently going through a paradigm shift in the acknowledged definition of what "development" is. The big factor in this shift, said Rogers, is how development has occurred in the People's Republic of China. Some of the key characteristics of the new "development" paradigm according to Rogers, are: (a) equality; (b) distribution; (c) self-development; and (d) at least a partial rejection of technology as a tool.

Arthur Harkins asked the rhetorical question: Why should we not have large (infinite) numbers of alternative paradigms? Maruyama's work is useful, said Harkins, but perhaps too "far out". There is a need for some kind of "macro-frame" of reference to make the creation of new paradigms responsive to the needs of the "real world." Above all, Harkins argued, we need a respect for,

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* Technological Forecasting and Social Change, VI, 3-32 (1974).

and an ability to treat constructively, coexisting, even conflicting, paradigms.

Some References on Paradigms.

In addition to the works cited above, the following are some references which might be useful in pursuing the subject of paradigms further:

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Harman, W. "Nature of Our Changing Society: Implications for Schools." In P. Piele and T. Eidell (Eds.), *Social and Technological Change: Implications for Education.* Eugene, OR: Center for the Advanced Study of Educational Administration, University of Oregon, 1970.

Markley, O.W., et al. *Changing Images of Man*. Policy Research Report 4. Menlo Park, CA: Stanford Research Institute, May 1974.

Vickers, G. *Social and Institutional Reality*. Cambridge, MA: Division of Study and Research in Education, Massachusetts Institute of Technology, September 1974.

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Bateson, M.C. *Our Own Metaphor*. New York: Knopf, 1972.

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Appendix F

A NOTE ON POSTSECONDARY EDUCATION

L. J. Perelman

The following remarks are adapted from a memorandum I wrote in early 1974 where I stated the rationale for a project focusing on the postsecondary level of education, in response to the issues surrounding "limits to growth."

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1. Among those who have recognized the challenge posed by the limits to growth, there is widespread agreement that education holds the key to the transition to the equilibrium state. Much of the response so far though has been directed at innovations in primary and secondary schools. While such efforts are certainly welcome, it is my conviction that the priority effort in this area in the near term must be made in higher education. The overriding reason for this is the belief that we may have only a single generation, or even less, in which to make substantial progress towards the establishment of a state of equilibrium. If this is so, then it is essential to have an immediate impact on the premises, values, consciousness, and skills of those who are either already in, or are about to enter, positions of leadership in the institutions that govern contemporary society. Another rationale for the priority of the postsecondary level of education to deal with the problems of limits to growth is the following:

2. Demographically, U.S. birthrates have been steadily dropping since around 1959, when the post-War "baby boom" ended. Consequently, the largest single age cohort in the U.S. is now about 15 years old, and they get steadily smaller as you go down from there. What this means is that elementary school enrollments are already declining; secondary school enrollments will start to decline within a couple of years. It is projected that undergraduate

enrollments might start to decline after 1980, but a lot depends on whether and to what extent the proportion of high school grads either continuing on to higher education, or "dropping back in" will grow. Many futurists today feel that enrollments in post-secondary education of all kinds will grow for another thirty years or more, although full-time enrollments in four-year colleges and universities will probably decline.

Essentially this means that an investment in innovation in elementary and secondary education is certain to reap diminishing returns, not only in terms of absolute numbers "educated", but perhaps even more importantly in terms of "generational dominance." The "baby boom" generation is going to have a lot more power in this society (U.S. and Europe) for at least the next thirty years or more than is the "baby bust" generation, just as they exercised a dominant influence in recent history compared to the "Depression" generation. If we want to get this society out of the jaws of crisis, we had better get the "baby boom" generation attuned to the needs of the equilibrium state. Intensive programs in post-secondary education are going to be essential.

3. The time is ripe for significant innovation in higher education. Some people think that higher education is entrenched and resistant to change. Departments are the seats of power; this balkan structure makes change embattled and slow. Undoubtedly, this has been true in past and still persists to a considerable extent. Yet I think that we have now entered a unique epoch when the prospects for major innovation in higher education are generally quite promising, if the opportunity which now exists is properly exploited. Institutions of higher education in the U.S. today are in a state of enormous stress if not crisis. The pressure for change is great. Financial problems are the chief, but not the only, source of this pressure. Colleges find themselves competing for students who are demanding to get more of what they want for their money. This creates the pressure for new, more attractive, and patently more "relevant" programs. The department is no longer capable of providing the bastion of security

for faculty it used to. The Ph.D. "glut" is creating strong pressures to limit or do away with the tenure system. New influxes of research money are likely to be far more "problem-centered" than ever before, demanding greater capabilities for interdisciplinary work. Furthermore, postsecondary education is rapidly expanding beyond the bounds of conventional higher education. All of this seems to make both the need and the possibility for rapid and exciting innovation in higher education quite prodigious.

Appendix G

IDEAS FOR ACTION

I. Ideas for Curriculum Innovation

A. Halvor Kolshus: To meet the growing demand among students for studies in futurism, three steps are suggested.

1. Pump money into some (4 or 5) select institutions
2. Look for prospects for continuing effort (e.g., seed money).
3. Approach the members of the Union for Experimental Colleges and Universities as prospective sponsors.

B. William Bergquist: Provide money to large state educational systems (e.g., California or New York) to establish curriculum review boards and for the development of multi-insitutional programs.

C. Lewis Perelman: Promote evaluation research on the instructional development of problem-centered courses and programs which are humanistic, global and futuristic in nature.

D. Chris Argyris: A possible iterative sequence suggested --

1. Do a summer course for a large number of teachers and managers.
2. Take the ten best and give them a year of retraining.
3. From these, one develops some strong faculty.
4. These, in turn, develop some strong graduate students.

E. Everett Rogers:

1. Analyze exemplary, successful programs.
2. Run field 'experiments', that is, try-out and evaluate programs in a controlled situation.

F. Donald Michael:

1. Look for activities underway that have favorable attention and attempt to multiply them.
2. Try to influence some people in a positive way.
3. Support an on-going movement.
4. Endow a few chairs in public (rather than private) institutions.
5. Provide money to support people to educate legislators and educational policy-makers on the needs for educational innovations.
6. Look for faculty members with good ideas for new courses and provide the moneylacking and needed to start them.

G. Arthur Harkins: Use money to buy curricular changes in higher education.

1. Buy chairs, etc.
2. Buy key faculty time for research, not for teaching.
3. Buy old faculty time.
4. Buy half of a person and get a commitment for long-term-support.

H. Walter Bogan: Work with inter-institutions. Also run a project like the Carnegie Commission. In addition:

1. Generate "challenge money" for innovation: funding agency consortium.
2. Enhance the state of the art; get to people who allocate institutional resources; communicate with practitioners.

I. William Bergquist: Fund a small private college to make curriculum transformation to deal with limits to growth. The College of the Atlantic is one possibility, or find a traditional institution interested in change, perhaps through the Council for the Advancement of Small Colleges.

Alverno College is an existing model for the development of a multidisciplinary, experience-based curriculum.

J. Lewis Perelman: Provide general support for the College of the Atlantic.

II. Ideas Concerning System Dynamics and System Education

A. Lewis Perelman: Improve system dynamics instruction to increase productivity.

1. Establish a fellowship program to train educators in system dynamics and system dynamicists in educational curriculum development.
2. Provide support for Becker's World Systems Workshop at the College of the Atlantic.
3. Increase the development of games and simulations to teach fundamental systems concepts.

Further educational needs in system dynamics are:

4. Improvement of curricula for system dynamics specialists: textbooks, programed materials, teacher-training methods and materials, and audio-visual materials.
5. Development of system dynamics curricula for other specialists.
   a. undergraduates
   b. related graduate and professional (problem-centered) fields--business, planning, education, health, government, economics, etc.
   c. materials and instructional modules based on specific models--Urban Dynamics, World 3, Macro, etc.
   d. professional and management seminars, institutes, etc., including training of seminar leaders and packages of seminar and institute methods, materials.
6. Development of system dynamics and other systems science curricula for elementary and secondary schools; methods, materials and teacher-training included.

7. Development of system dynamics and other systems science curricula for the general public,including general systems methods and concepts,and specific problems and models, such as World 3, Macro, Food, Urban Dynamics, etc.

B. Lewis Perelman: a mental models research project.

1. It is Jay Forrester's hypothesis that:
    a. ordinary experience conditions simple mental models.
    b. mental models are bad for a variety of reasons.
    c. therefore, we must build System Dynamics models to 'drive' complex systems.
2. Lewis Perelman suggests an alternative hypothesis that:
    a. non-ordinary experience might condition complex mental models.
    b. If Jay Forrester is right, then this implies a required elite of system dynamics consultants for all critical problem-solving.
    c. good mental models might be more cost-effective than System Dynamics models.
3. The method for the research:
    a. test a subject's ability to learn to drive complex systems from experience only.
    b. test a subject's ability to learn to drive complex systems from experience and systems principles.
    c. test a System Dynamicist's ability to learn to drive complex systems from experience only.
    d. test a System Dynamicist's ability to learn to drive complex systems by building system dynamics models.

C. Dennis Meadows:

1. Develop a programmed text for Dynamo.

2. Develop computer assisted instruction for studying the structure and behavior of complex systems.
3. Construct models for living: canonical forms of complex system behavior.

III. Seminars and Workshop Ideas

A. Duane Elgin: Begin a brokerage function between the world of consciousness research and practice and the world of social functioning--this could filter through and affect a number of institutions in an oblique way.

B. Lewis Perelman: Global therapy--the development of techniques and theory (experiential/action) for "changing images of man."

C. Willis Harman: Hold planetary management seminars to foster the goals outlined in Harlan Cleveland's Future Executive.

D. Lewis Perelman: Support the development of curricula and techniques for planetary management seminars and institutes following the Transcendental Meditation model for diffusion. Also, hold seminars, workshops, institutes for organizational development people on ecological education and related needs for institutional change and innovation.

E. James Bright: Efforts must go into educational technology (Rogers model).

IV. Media Ideas

A. Kan Chen: Translate Growth Policy (Chen and Lagler) into audiovisual media, targeting community colleges, local planning agencies and students at the undergraduate and graduate level.

B. William Bergquist: Collect and organize existing resources into a multi-media package for adult learners.

V. Miscellaneous Action-Oriented Ideas

A. Lewis Perelman: Programs in no-growth or steady-state economics:

Since it is not now possible to create a full curriculum on any one campus, create a University Without Walls program in graduate studies in steady-state economics:

1. Enlist active participation of leading steady-state economists in the U.S. (and perhaps elsewhere).
2. Engage appropriate University Without Walls institution(s).
3. Provide funds for the development of curricula and instructional materials.
4. Provide scholarship money.
5. Provide money (matching?) for program development and administration.

Follow-up: Efforts should be made to plug graduates of this program into university departments of key steady-state economics faculty, with the goal of developing sufficient faculty for on-campus programs.

B. Lewis Perelman and Ronald Pion: Develop the area of parent education.

C. Sydney Howe: Areas in need of support:

1. Communication between activists and academics.
2. The pressing and servicing of established growth-control techniques.
3. The convening of environmental and social-welfare/housing forces for consensus-building.

D. Donald Michael: If a major collapse seems likely, then you turn your attention to preserving 'seeds' (Fahrenheit 451, the Jewish and Sufi traditions).

VI. Miscellaneous Research-Oriented Ideas

A. Lewis Perelman: Support research on environmental values and ethics: ethical theory, 'values-clarification' techniques, and 'values technology' (Harkins).

B. Edward Weidner: The Rockefeller Brothers Fund should help study ways to give people the right to recurrent education.

C. Willis Harman: The Rockefeller Brothers Fund should support psychic research.

D. Lewis Perelman: Support a study of the implications of extra-terrestrial travel for "limits to growth".

E. Kan Chen: Foundations should support additional projects like the Ford Energy Project.

F. William Bergquist: Provide some money to land-grant institutions for research on social and community aspects of limits to growth.

Appendix H

SUMMARY OF INTERVIEW FINDINGS: William Bergquist

In my interviews with educators from throughout the United States I was able to identify five basic themes, these themes being either identified by a number of the individuals being interviewed or particularly emphasized by one or two interviewees. These themes are:

1. The limits to growth issue may itself be symptomatic of a more basic, systemic problem, related to the functioning of organizations in our society, to the skills which individuals possess in working in these organizations, and to the goals and values which people hold as members of these organizations. This being the case, the issue of growth should be directly confronted; however, we should recognize that ultimately the problem of growth can only be solved by a successful confrontation of the more basic problem(s).

2. The problems associated with growth require new skills and knowledge bases if they are to be solved. The primary role of postsecondary education should be neither to solve these problems (a social action model), nor to ignore the problem in deference to detachment, objectivity and broad perspectives (the so-called "ivory tower" model). Instead the role of postsecondary education should be to provide citizens with the skills needed to solve the pressing social problems. In other words, the role of these institutions is not to promote a specific ideology of change, but rather to present the technologies of change, the historical and philosophical perspectives on change, as well as skills in values clarification, so that citizens can move toward change in an effective, yet thoughtful, manner. This new "citizenship" will require a major reorientation of most collegiate curricula.

3. Very few collegiate institutions currently offer programs that are sufficiently large (in terms of involving all segments of the campus) to provide students with a complete education in the areas related to growth issues. Those programs that do incorporate most of the areas related to growth (e.g. ecological studies, alternative technologies, system dynamics, theories of change) tend to be quite diffuse, without any clear, comprehensive curriculum. Many of the individuals in very progressive institutions who fully support the necessity of limits to growth and of collegiate institutions being responsive to the growth issue are also quite liberal in their philosophy of education. They

believe that the educational programs of a collegiate institution should be responsive to the immediate educational interests of the students, in collaboration with the faculty. A preplanned program which places primary emphasis on growth issues would be incompatible with the educational philosophy of these individuals, hence they tend to resist the idea of a basic curriculum that is completed by all of the students in the institution. Four different types of institutional settings were identified through the interviews.

Type of Curriculum (Growth-Related)

Institutional Commitment To Growth-Related Curriculum	Unstructured (Diffuse)	Structured (Preplanned)
Part of the Institution	TYPE I e.g. Honors Colleges; standard ecology program	TYPE II e.g. Program for Global Survival (U. of Mass.)
All of the Institution	TYPE III e.g. Evergreen State College	TYPE IV (None now in existence)

Type I institutions are those in which a few individuals are involved in some activities related to growth issues; however, these efforts tend to be sporadic and often short-term. There tends to be little institutional commitment to the efforts of these individuals, hence the professor or students usually can not sustain the program, or develop a fully worked-out, mature curriculum. Most of the institutions that were visited in this project fit into this category.

Type II institutions are few in number. We found only one institution that included a program that was directly focused on the growth issue. This program, at the University of Massachusetts, appeared to be quite successful in terms of being thoughtfully constructed and enthusiastically supported by its participants. However, because the program only involved a small percentage of the total number of people in the institution it had very little total impact on the campus, and was unknown to most of the other faculty and students. Other Type II institutions probably exist, but also probably experience similar problems of total institutional acceptance and visibility.

Type III institutions are becoming more common. These are highly innovative, freeform colleges such as Evergreen, Johnston College, Prescott College, and Ben Salem. While most of these experimental colleges offer many of the components of a total growth-issues curriculum, they are not committed as a total institution to being responsive to these issues. Instead, as a total institution, they tend to be responsive to the interests of the students and faculty--which may or may not be related to issues of growth.

Type IV institutions would be those in which the total institution is committed to a comprehensive, coherent program that prepares students for the issues of growth. Such an institution would exhibit a basic rationale, set of educational goals, and sequence of educational programs that would produce students with an adequate grasp of the problems of growth to be in a position to help solve these problems. We found no institution that currently qualifies under this category. Either new institutions are needed, which would seem to be a solution which itself reflects an acquisition to growth, or current institutions must be reoriented toward this new curriculum.

4. The people who currently have the skills needed to solve problems related to growth are in short supply. Their number can not be rapidly expanded through current professional training programs. New models of training and education must be adopted. These models include paraprofessional training programs, regional programs for the sharing of scarce resources and assessment and crediting programs to determine and acknowledge the learning that has occurred in informal educational settings.

5. The collegiate institutions that would seem to be most appropriate for carrying out growth-related research, training and community services are those from the land-grant tradition. These institutions have a long history of extension services to the local communities (training both college-age students and adults), as well as available resources in such critical, growth-related fields as agriculture, forestry and engineering. A second type of collegiate institution is particularly appropriate to significant curricular reform, this type being the small, private, liberal arts college. These institutions are small and, in most cases, independent of significant change; furthermore, many of these institutions are now seeking to develop a distinctive curriculum as a means of remaining competitive with other private and public institutions.

Appendix I

RELEVANT STATEMENTS FROM RECENT NATIONAL COMMISSIONS

Carnegie Commission on Higher Education: "Priorities for Action: Final Report"

> "Society increasingly needs the contributions of higher education. . . to enlarge the understanding of the interconnectedness of the environment and of its fragility over time; to reduce the birthrate as levels of education rise; to expand activities that absorb the attention and energies of people and yet consume few scarce resources and contribute little to population--activities that are ecologically sound." (pp.14-15)
>
> "To help train individuals and to devise social means so that the power of the machine, the power of the massive organization, the power of entrenched leadership is less likely to overwhelm man; to help build strength in individuals to confront the more powerful technology and the more powerful social structures of modern society; to help avoid 1984." (p.15)
>
> --On the other hand, the Commission also recommended that higher education ". . .can help lead to . . . work in a more productive economy," which could reflect a growth policy.
>
> "Higher quality in teaching, in curriculum offerings, in campus environments, in research and service, and greater diversity among and within, and greater effectiveness of, institutions are clearly possible and highly desirable. The "tidal wave" of students of the 1960's was handled with great success; the new imperative is a more modest wave of interest in quality, in intensive rather than extensive growth--albeit that the former is more difficult than the latter to achieve and can never be doubled, as were enrollments, in the course of a single decade." (p.31)

Study on Continuing Education and the Future: "The Learning Society"

> "The obsolescence of knowledge, the rapid growth of new knowledge, the shifts in national priorities, the multiplication and complexity of societal problems, and the close relationship between the application of knowledge and social progress--all lead to the conclusion that lifelong learning is not only desirable, but necessary." (p.1)
>
> "The educational needs facing society are too great . . . to be challenged effectively by unilateral moves on the part of formal schooling systems or other institutions acting alone. Organizational

as well as attitudinal changes are called for to modify . . . the excesses of acquisitiveness in American life, the further pollution of the environment, the deterioration of the cities . . . . Institutions are being challenged to share the responsibilities of planning educational experiences that will improve our ability to make decisions affecting the future and to avoid the catastrophic outcomes many scientists are predicting.for us on an overpopulated, economically imbalanced planet. Thus, education should become the responsibility of all components of organized society." (p.8)

"Recommendation 1: A substantial part of the undergraduate curriculum in every subject matter area should be redesigned to help students learn how to carry out a program of self-education and lifelong learning." (p.13)

"Recommendation 6: Consortia of institutions should be established on a local, regional and national basis to provide resources for continuing education with the aim of making sure that virtually all citizens have access to continuous learning of high quality." (p.29)

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